ASTER: Modern Metals, 435 N. Michigan Avenue, Chicago 11, Illinois. Return Postage Guaranteed. Form 3579 Requested. • NOVEMBER, 1960

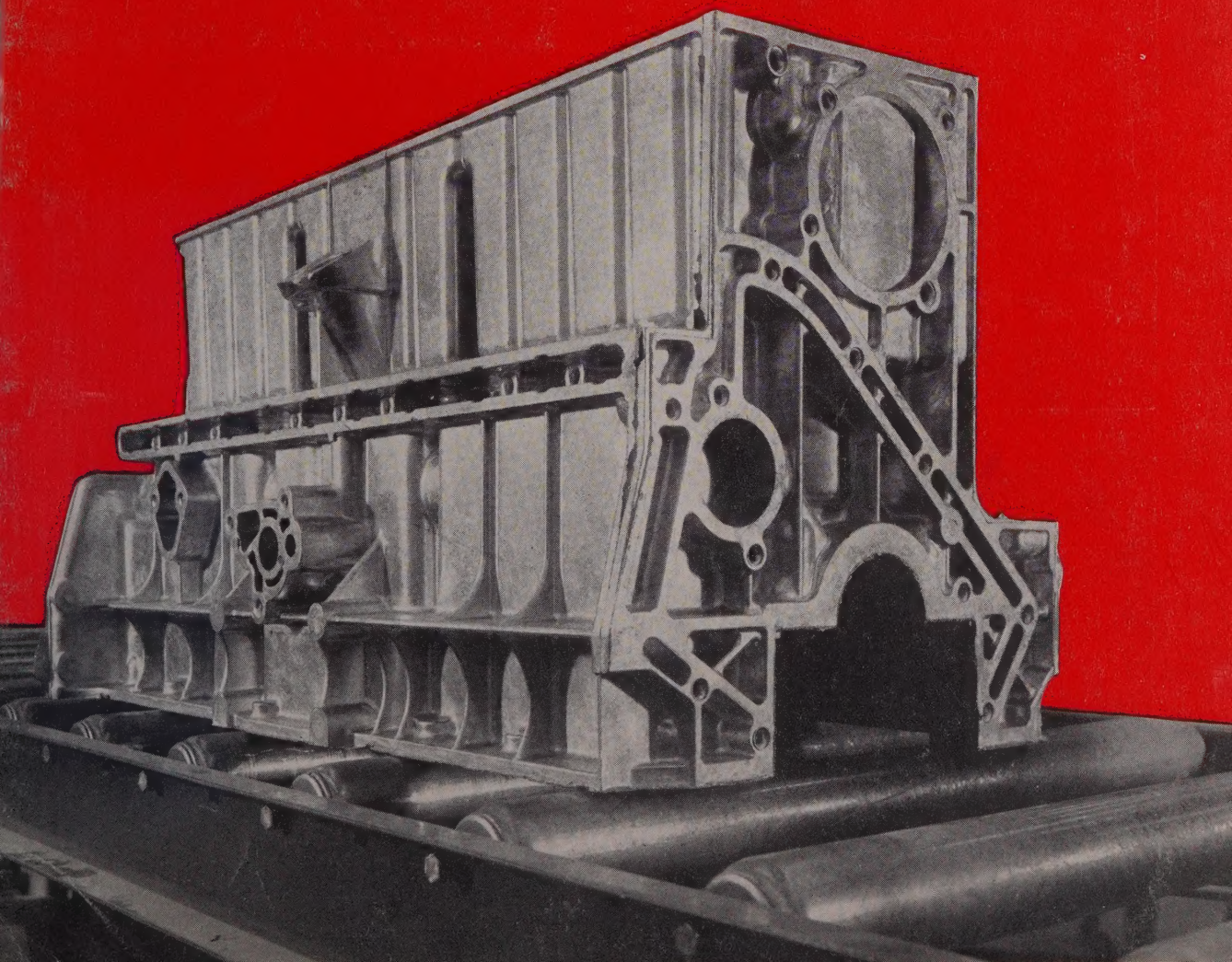
MODERN METALS

REROLL REVOLUTION

Aluminum fabricators comment on plan for cooperative hot rolling mill (see page 30).

IMPACT OF COMPACTS

Steel's loss is aluminum's gain, as auto makers put lightweight engines into seven new models [page 72].



AJAX

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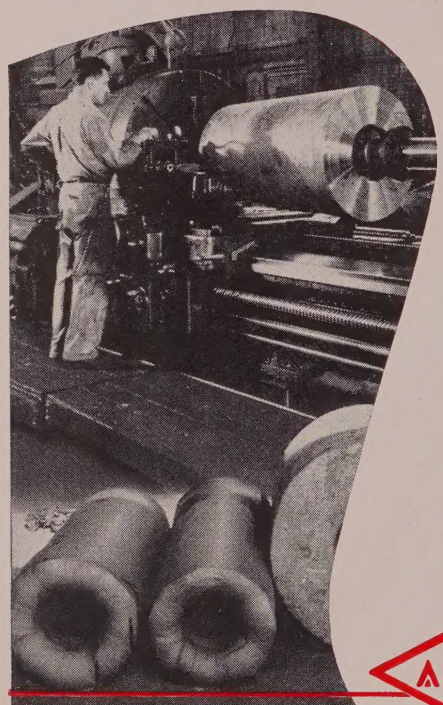

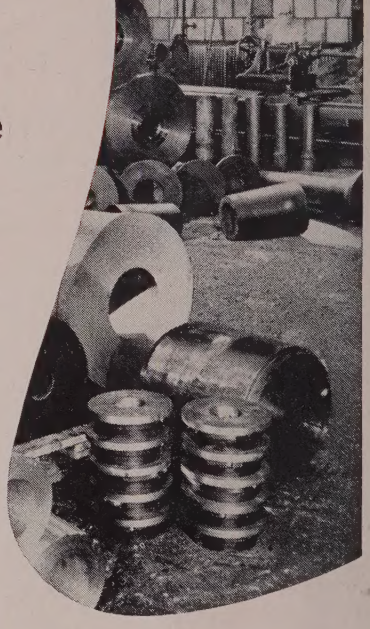

AJAX Steel and Forge Co.

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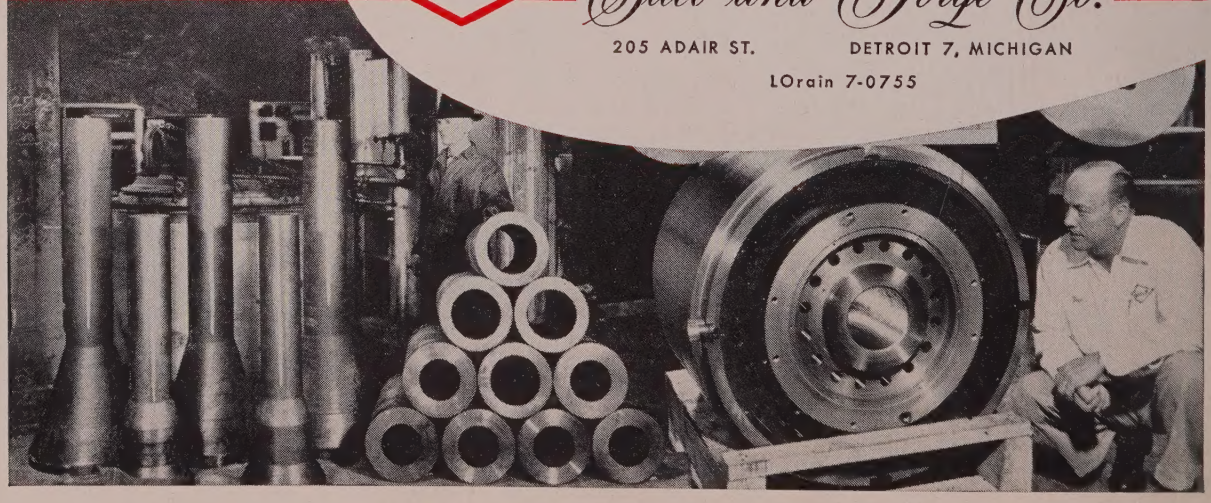

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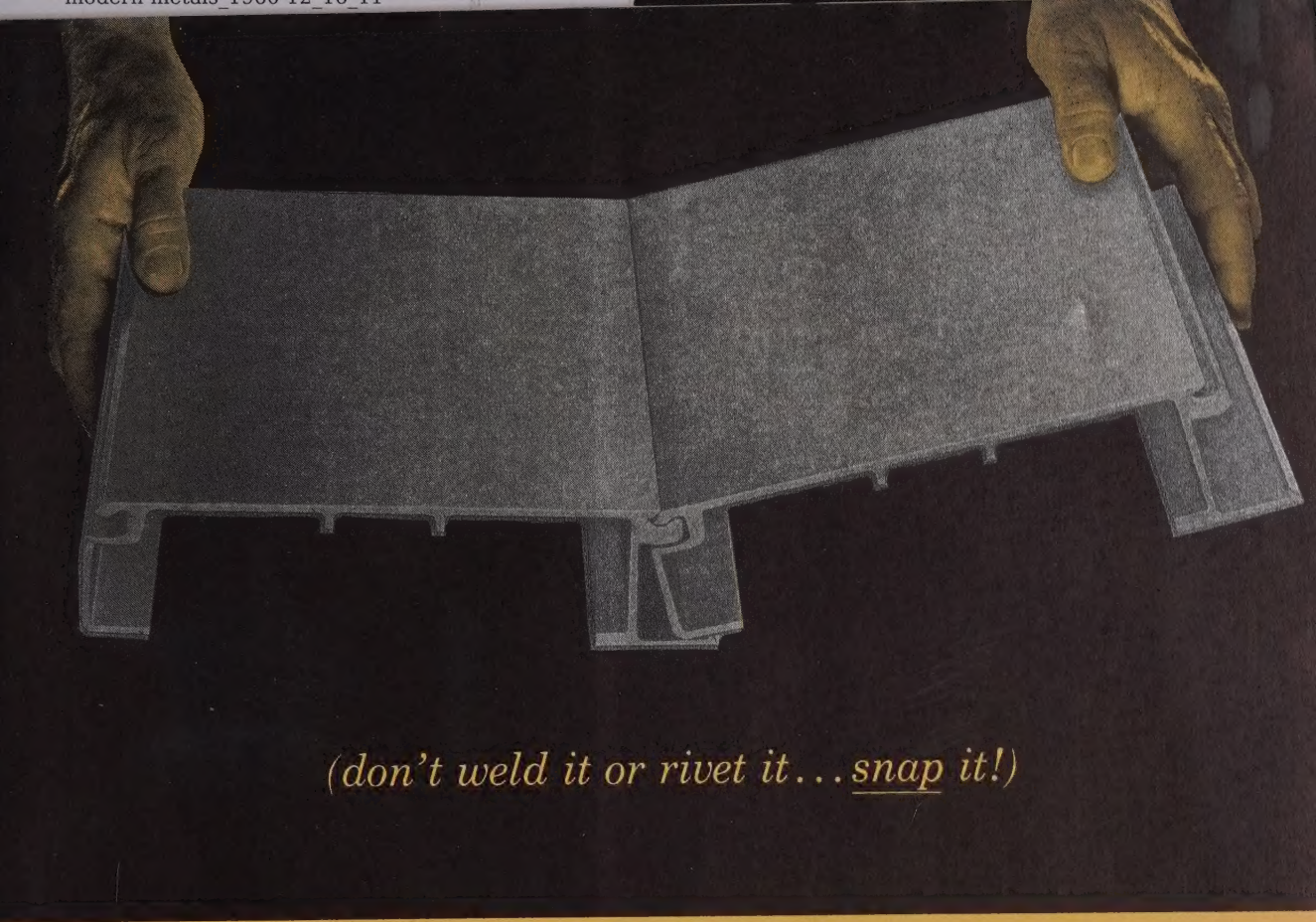


(don't weld it or rivet it... snap it!)

New way to build a box—or a wall—or a floor

Reynolds Aluminum Interlocking Extrusions

Reynolds Aluminum interlocking extrusions actually give you another choice in fabricating methods—a really efficient, cost cutting choice. Sections can be joined together, securely, permanently. Thus, you can produce an aluminum panel that's lightweight, strong, and rigid, with no welding or riveting. See next page for details.

Reynolds Aluminum Interlocking Extrusions

Here's a new, cost-cutting way to put a panel together —a panel made with strong, lightweight, rustfree Reynolds Aluminum. The new fabricating method: Reynolds Aluminum interlocking extrusions.

With these extrusions, and their exclusive design, you can build a strong, rigid wall, or floor, or panel by interlocking sections together. You eliminate a lot of welding and a lot of rivets; and the joints are secure, strong, and permanent.

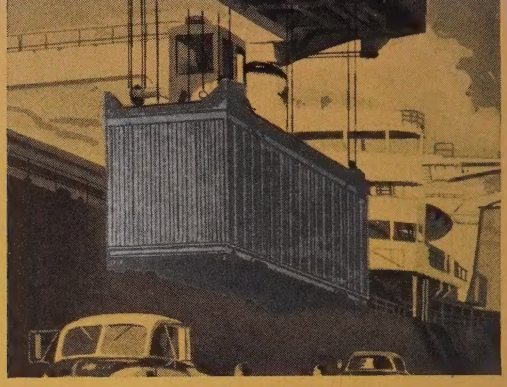
The panel you build with Reynolds interlocking extrusions is really solid, because the design provides an integral reinforcing brace at every joint . . . or between joints as required.

You can achieve major production savings with fast, efficient interlocking fabrication methods, but the savings don't end there. With Reynolds Aluminum extrusions, you can pre-fabricate sections of panels conveniently in a shop, assemble or erect the sections easily and quickly at the job site.

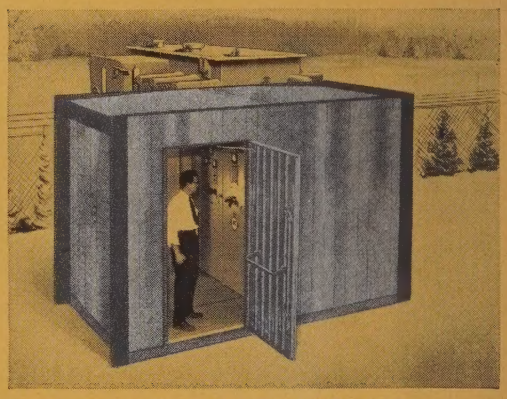
Although the basic idea behind all Reynolds interlocking extrusions is the same, the design can be varied to meet specific job requirements. Already, variations of the interlocking extrusion idea have proved themselves, in production and performance benefits, in such wide-ranging uses as electrical switchgear housing, truck and refrigerator car flooring, ship deckhouses, airplane hangar doors, containers, and temporary or portable tool houses.

If you have a "box" to build (from a small container to a warehouse building) or a floor or a panel of any kind, see how many rivets you can save, and how much welding. Investigate Reynolds Aluminum interlocking extrusions. For details, contact your local Reynolds office, or write *Reynolds Metals Company, P.O. Box 2346-GM, Richmond 18, Virginia.*

Watch Reynolds new TV show
"Harrigan & Son", Fridays;
also "All Star Golf", Saturdays—ABC-TV

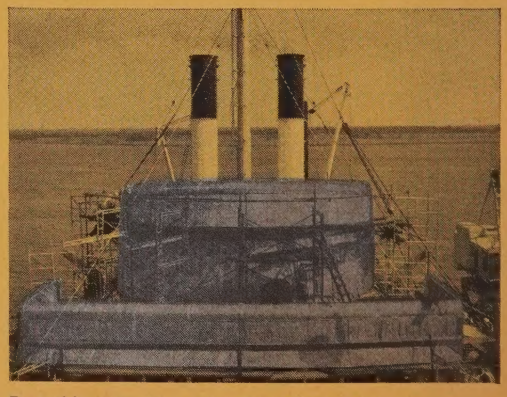


Containers made with Reynolds interlocking extrusions combine aluminum's light weight with extra strength and rigidity.

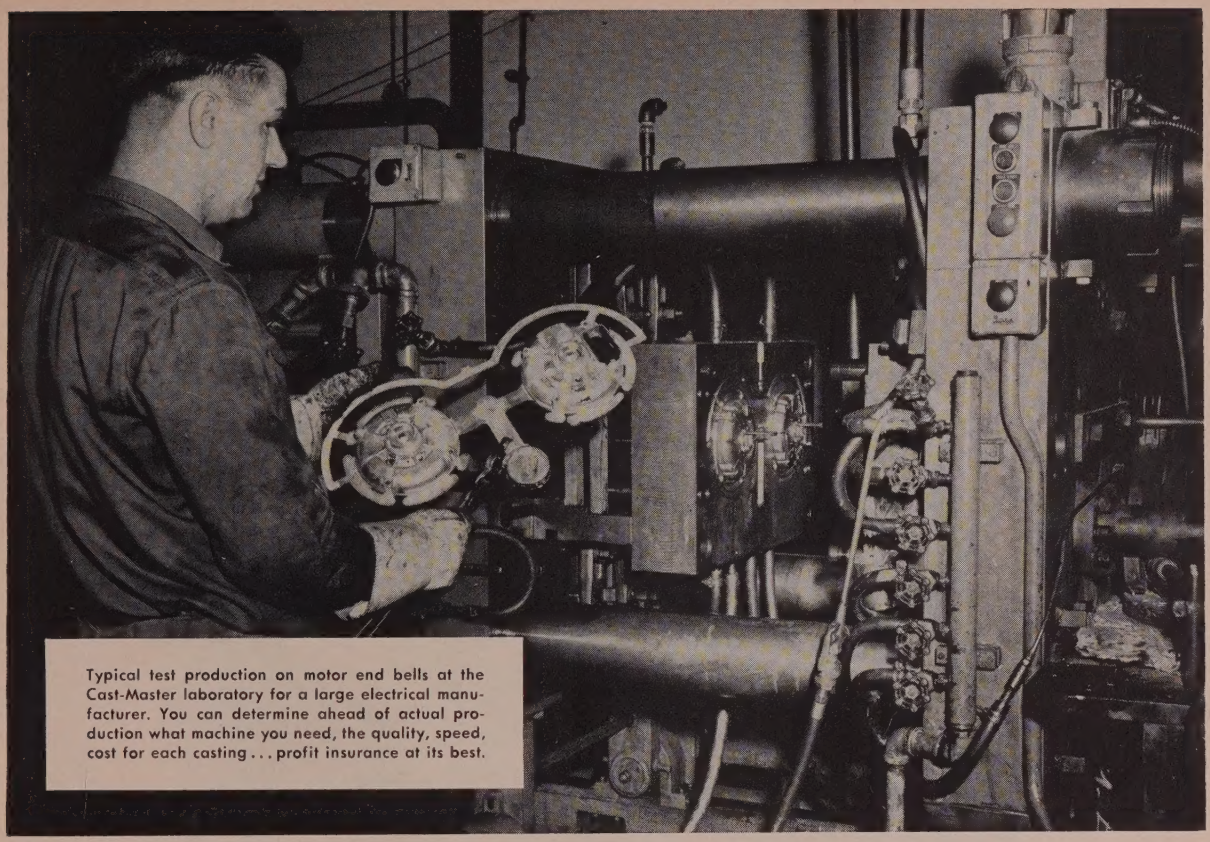


Electrical substation unit built with Reynolds extrusions is strong, rigid, thanks to integrally-reinforcing extrusion design.

Truck flooring made with Reynolds extrusions is available in a range of designs using interlocking principle.



Reynolds extrusions cut welding time, fabrication and erection costs in construction of water-tight ship deckhouse.



Typical test production on motor end bells at the Cast-Master laboratory for a large electrical manufacturer. You can determine ahead of actual production what machine you need, the quality, speed, cost for each casting . . . profit insurance at its best.

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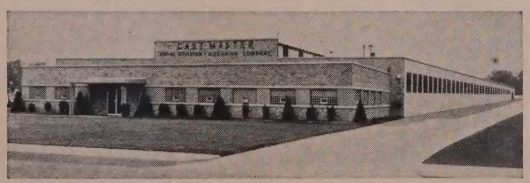

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MODERN METALS
Read in companies that produce, fabricate and cast aluminum, magnesium and titanium, and firms that use these metals in manufacturing end products.

ON THE COVER: The aluminum engine block, die cast at the Toledo, Ohio, plant of the Doehler-Jarvis Div'n of National Lead Co., is headed for a 1961 Rambler Classic Six. Of the seven compact cars that eschew gray iron for aluminum in the power plant, this model year, Rambler's is the only one that is die cast — a technique that is viewed as the ultimate for this automotive application. Adoption of aluminum for engines by three of the four leading car makers doesn't necessarily promise a huge increase in aluminum consumption this year. What is important is the heightened prestige the light metal gains in '61.

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Modern Metals has by far the world's largest circulation among light metals fabricators, foundries and product manufacturers who use aluminum, magnesium, and titanium. Circulation: Now over 15,000 copies per month. Acceptance under controlled circulation at Barrington, Ill.

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PUBLISHER W. B. GRIFFIN

Modern Metals

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SHEET MILLS TO JOIN FORCES **30**
Together with Aluminium Limited, three independent sheet producers will build a giant $30 million mill to produce reroll stock. Other fabricators comment.

DEEP DRAWING CANS FROM PRE-COATED SHEET **38**
A can company, a primary producer and a machine manufacturer have joined hands for aluminum's latest thrust at the tin-dominated can market.

BENDING ALUMINUM (Part 2) **42**
Procedures for roll forming strip, bending plate, extrusions and tubes are detailed. (Part 1 appeared in September, p. 44.)

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Filter is said to speed production, cut mill operation and filter costs, conserve coolant, prolong roll life., etc.

EXTRUDED, ANODIZED MARINE HARDWARE **61**

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ENGINE BLOCKS BOOST ALUMINUM'S STAKE IN AUTOS ..... H. K. Darby **72**
Aluminum tonnage is going up, but perhaps more important is the sharper image the metal is gaining as an automotive construction material.

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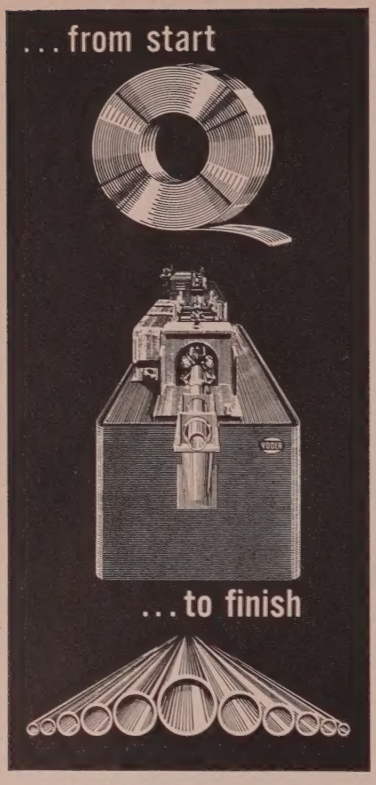
Customers can now buy short-run or volume production cases, containers or housings without incurring any tooling costs.

NEW ANODIZING PROCESS **86**
Uniform, fade-proof colors are claimed for the new Kalcolor anodizing process which converts metal's alloying elements to desired hues.

STUD WELDING CURTAIN WALLS ..... H. P. Blood **88**
Speed, versatility and minimum distortion claimed advantages of stud welding system.



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Letters

Australia Wants Hand Trucks

Sirs:

This company is interested in manufacturing aluminum hand trucks under license. Could you please refer us to some manufacturers that we could contact?

"B"—Queensland

MM—There are any number of hand truck manufacturers who would doubtless be glad to license your firm.

If any such manufacturer is interested, we'll be glad to forward any letters to "B" in Australia.

From Molten Metal To Coiled Strip

Sirs:

In your July issue you ran an article, "Continuous Trip from Molten Metal to Coiled Strip." I made several notes relative to the data within this article, but do not have the proper address of the Lobeck Casting Processes, Inc. I believe this is the company who has been licensed by Pechiney to sell or make this equipment here in the United States.

I would also appreciate the address of the Pechiney organization in France.

"R"—Georgia

MM—Address of Lobeck is Loma Machine Mfg. Co., 114 East 32nd St., New York. Write Pechiney at 23 Rue Balzac, Paris 8, France.

Aluminum Hearings

Sirs:

I am interested in an article that appeared in your magazine in June, July and August on "Government Investigation on the Pricing of Aluminum Industry." In this article, there was a statement by Mr. Skinner of General Motors Corp.

If it is convenient, I would appreciate it if you would send me a copy of this statement.

"R"—New York

MM—This refers to the three-part series on the Yates Congressional hearings on aluminum wherein General Motors and a host of other firms appeared as witnesses. We didn't reprint the series, but found a set of tear sheets which have been sent.

Import or Make Aluminum Ladders?

Sirs:

. . . My main line is the manufacture of all types and sizes of aluminum alloy ladders, steps, trestles, towers, stairways, fire escapes and other specialized equipment in aluminum alloy for government departments, War Office, Admiralty, General Post Office.

I made my first simple ladder in 1945, and our business has grown so that now we have our main works in Newport, Monmouthshire, England, and branch plants in the North of England, Isle of Man, Dublin, New Zealand and Australia.

We ship to some 45 foreign countries. I was in Canada and found that we could ship to Montreal at 40% under list price of a far inferior article. But the commissions asked by the Importers, Factors, etc. spoilt our chances of business through normal channels. I was told that there is a far greater field for our business in the U.S.A., where the population is so many times larger, but we have no contacts.

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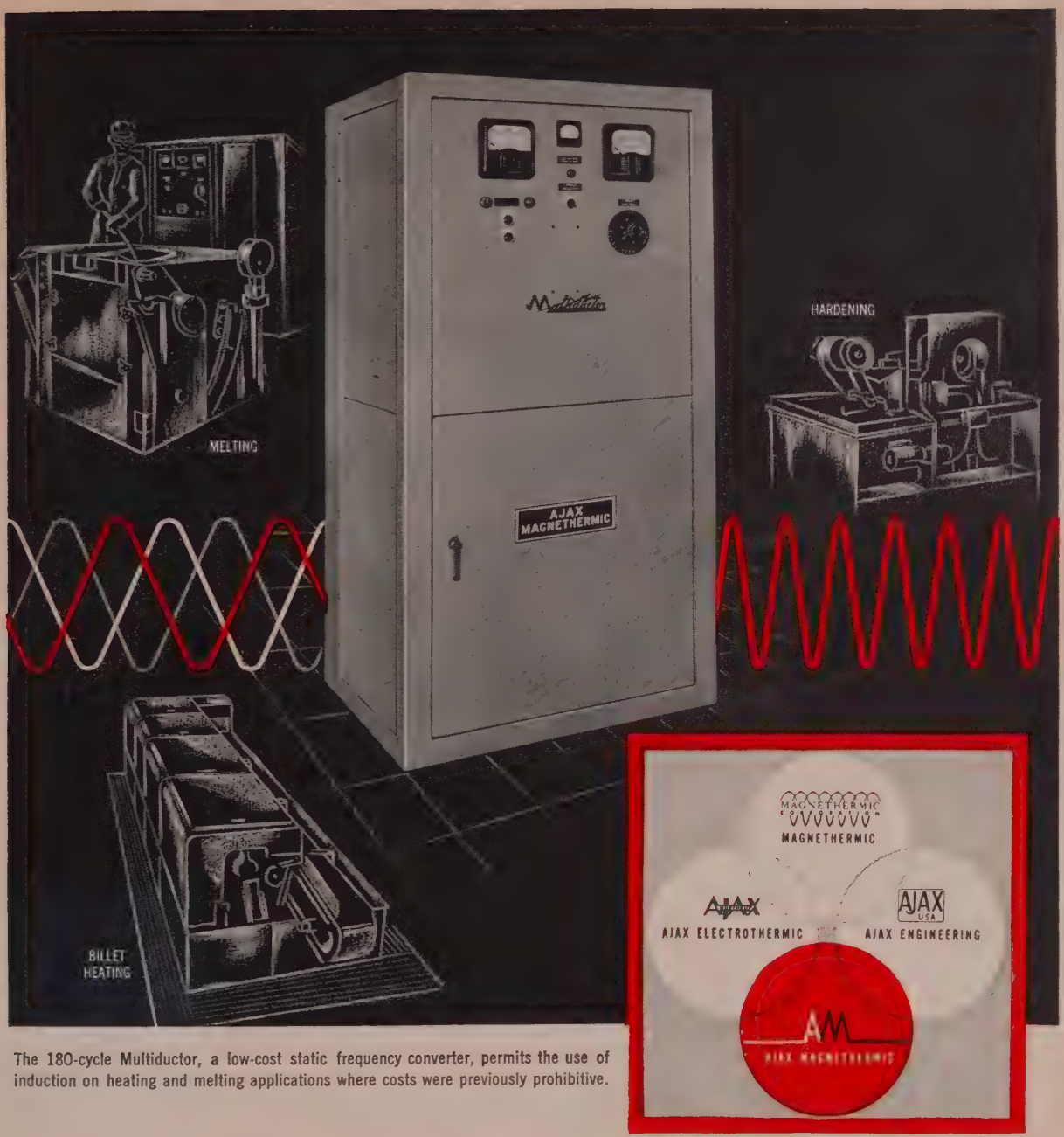

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4

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Reason No. 2

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Reason No. 3

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Reason No. 4

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much cheaper labor costs, plus a fine team of workers, and with freight charges across the Atlantic on weight, we are in a remarkable position to ship in to the U.S.A. cheaply.

You might perhaps, if you can spare the time, be able to advise me:

1) Whether the charges made by importers, factors, etc. are so very high, so as to kill business through such channels.

2) Whether you consider there is a market for the best-made aluminum alloy ladders, etc., which might encourage us to consider opening up our own wholesale office in the U.S.A. If so, what would be a good strategic center for most sales?

I have heard it said that our articles are too good for the American market — you know British quality standards: Best finish and a job made to last a lifetime.

Now we do business with honor, so if you have friends or clients in this business whom you feel our entry into the market might harm, just please take no action. But if you can consider the field is still wide enough, then I'd be most glad to have your comments and ideas.

You may at first glance think, why not come and manufacture in the U.S.A.? Well, that is worth studying in detail, but I found that all our costs are so much lower than in the U.S.A., and with the rate of exchange in our favor, there seems to be a very strong case for manufacturing this side and shipping across.

This has one big disadvantage of course, in that we would have to judge what items would be needed on your side. We might be able to couple the two ideas: Stock the main lines, but make also in the U.S.A. the rarer demanded items and the many specialized items that crop up, once people know we can manufacture anything to get up to a height.

By the way, I am the inventor of the initial commercial aluminum ladder and personally own the 50 or more patents and as many registered designs.

Whatever you can do to help me, I think you will find this letter of some general interest to you, and I have found it most entertaining to sit down to write to you like this.

"C"—Isle of Man

MM — Our guess is that much the same problem exists here as in Canada. The sales cost would be more than your manufacturing costs. The ladder business is extremely competitive here.

If you manufacture a superior or unusual ladder, our guess would be to contact ladder manufacturers who might be interested in some sort of license arrangement to make them in the U.S.A. and Canada.

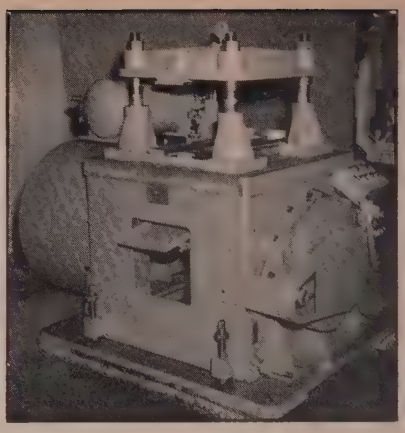
Wants Aluminum Grating

Sirs:

In the August 1960 issue of Modern Metals you had an article on Alaflor, an aluminum grating made by Northern Aluminium Co., Ltd., England. We are interested in such a product and would like to know sizes available, materials and prices, as well as the local distributor. Would you please forward this letter to them.

"F"—Virginia

MM—Northern Aluminium Co., a division of Aluminium Limited, recently changed its name to Alcan Industries, Ltd. Its main plant is located at Rogerstone, South Wales.



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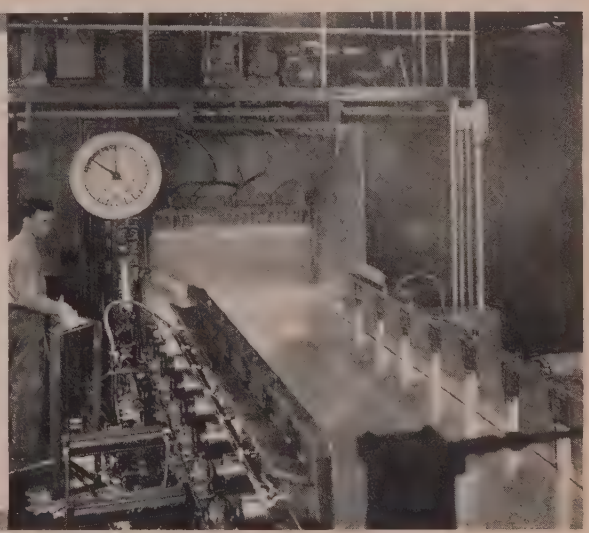
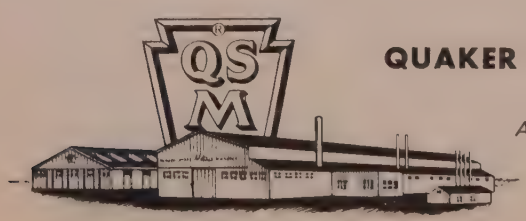


You can't afford to take chances with profit...

so for aluminum sheet, coil, or tubing that's guaranteed to meet your specifications, order QSM aluminum. When requested, written certification will be furnished.



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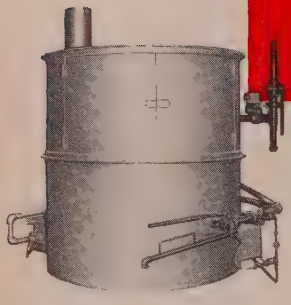
Deliver Better Metal Faster!

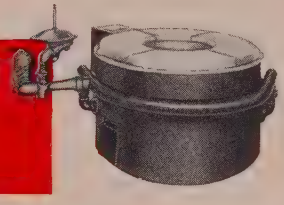
All WARWICK Furnaces, no matter how large or how small are designed and engineered to melt metal better, faster and at great savings in production costs. Antiquated melting equipment will "up" your production costs tremendously. Investigate the NEWEST, best and most efficient non-ferrous metal melting furnaces available. They are made in sizes to fit any desired capacities . . . and designs to assure utmost efficiency and economy for YOUR production. Here are just a few examples. A letter or phone call will bring immediate information on the complete line.

WARWICK IRON POT MELTING FURNACES FOR ZINC, ALUMINUM, LEAD or DIE CAST



These furnaces are highly recommended as breakdown furnaces for zinc and aluminum die casting and permanent mold plants. They also excel as holding furnaces. They can be supplied either with or without hoods to exhaust fumes and heat. Their construction assures longest pot life and lowest fuel costs. Choice of automatic or manual controls and oil or gas fire. Capacities from 50 to 9000 lbs. aluminum; 125 to 23,000 lbs. zinc; other white metals corresponding.

WARWICK STATIONARY CRUCIBLE MELTING AND HOLDING FURNACES FOR ALUMINUM



Built especially for use in permanent mold and die casting plants where molten metal is dipped from furnace with a hand ladle. Melting is done in crucible (no iron pick-up). Thoroughly insulated to protect the operator from heat. Oil, gas or combination oil-gas fire. Capacities 200 to 2000 lbs. in aluminum. Available with full automatic controls.

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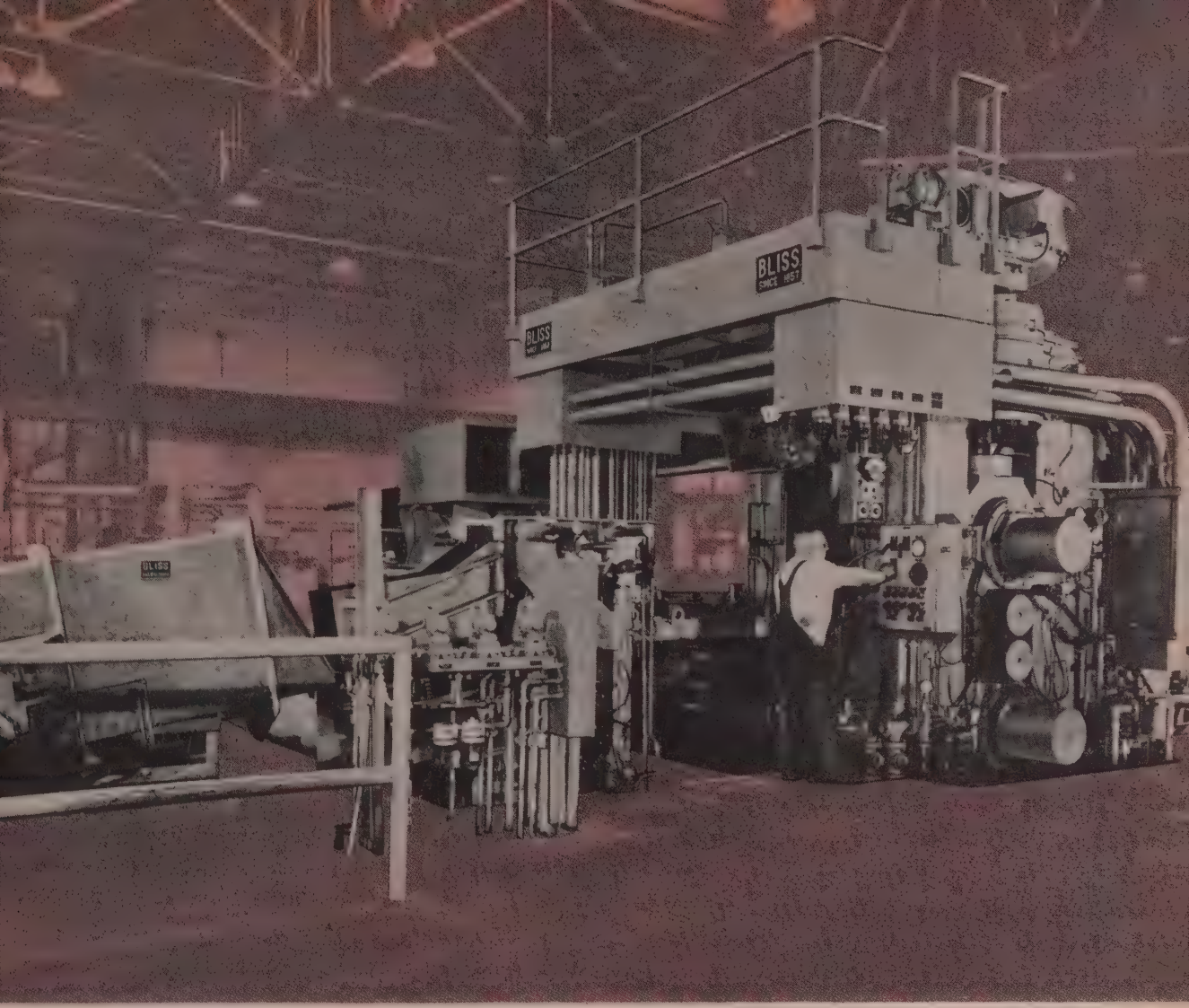
Here and There

Sights are Raised at B&P » » Brooks & Perkins, Inc., Detroit, is planning greater efforts in the bread and butter spheres of metalworking, while keeping its hand in the more exotic areas of the field. Hints as to how this will be accomplished were given by E. Howard Perkins, co-founder (in 1943) of this unique fabricating firm, on the occasion of his retirement as president of the company. He expects that his successor, Edward L. Ladd, "a real go-getter," will make no small contribution to B&P's future success. They ended fiscal '60 with a sales and earnings picture hardly different than fiscal '58-'59, but Perkins expects the company to move up in '60-'61 and, within the next three years, achieve 50% sales growth. This, he believes, will represent a "comeback" to the $10 million volume years of '54, '55 and '56. Ladd said they will push hard on B&P commercial lines in order to strengthen the firm. They will take on stainless steel work; have been aluminum, magnesium and titanium fabricators for 17 years. As now constituted, B&P's business is 75% military, 25% commercial. Ladd believes the ratio might change to 60-40, respectively. Perkins, who remains active as board chairman, believes that the 1962 automotive model year might herald increased usage of magnesium in that industry. There is some evidence that Chrysler feels the same way.

This One Is for Students » » Reynolds Metals Co. has instituted a sort of companion piece to its R. S. Reynolds Memorial Award. It is the Reynolds Aluminum Prize for Architectural Students. As its title makes plain, student architects are to be encouraged to think in terms of aluminum. Awards will be made for the best original design for any type of building component in aluminum. The student with the winning design in each participating college of architecture will receive a $200 prize. Each school will handle its judging in any way it chooses, but a jury of three distinguished architects chosen by the American Institute of Architects will judge the winning designs of the schools to determine the top winner. The prize will be $5000, half of which will go to the winner's school. The R. S. Reynolds Memorial Award is a worldwide competition for architects who will design in terms of aluminum. Alcoa gives annual awards to designers and design students. While no one will deny the great promotional value of these awards, their origin with competing aluminum companies might have a vitiating effect on the total image. Detachment is what's needed to raise the value of such awards and contribute more to industry advancement. Maybe the industry as a whole could sponsor such competitions. Somehow, it seems more fitting.

Maintenance-Free? Who Sed So? » » There are some signs that the bloom is off the rose for plastic boats. *The Wall Street Journal* reports that boat manufacturers expect total industry sales to dip 5% under last year's record $466 million. The story singles out "plastic and fiberglas boats, particularly among the smaller concerns," as being the main offenders in a



Western Electric feeds a varied diet to its new Bliss cold mill

Each year, about 30 million pounds of metal pass through the new Bliss cold breakdown mill at Western Electric's Hawthorne, Illinois plant. They include both ferrous alloys like Western Electric's Permalloy and a wide variety of non-ferrous materials such as brass, nickel silver and phosphor bronze. No matter what they are, the mill reduces them with ease and precision.

The 12″ and 28″ x 18″ mill is capable of reducing non-ferrous metals from an incoming thickness of .410″ to a finished gauge of .060″ and the special ferrous materials from an incoming thickness of .360″ to a finish gauge of .125″ at speeds up to 300 fpm."

Bliss supplied more than a mill to Western Electric. To meet the customer's particular needs, it designed and built the unique auxiliary equipment, including an inside and outside runaround conveying system, a special turn ender and a specially designed feed unit permitting off-center rolling of narrow material. "Tailoring" mills and equipment to the specific needs of the user is a Bliss specialty. For other examples of this "know-how" in mill design and installations, write for our 84-page Rolling Mill Brochure, Catalog 40-B.

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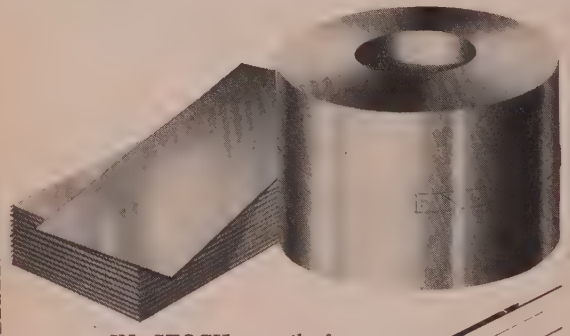

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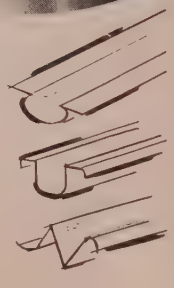

GLadstone 5-7000

PRECISION STEEL WAREHOUSE, INC.
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(Chicago Suburb)

spate of price cutting that reflected abnormal boat inventories. For example, a 15-foot "glass" model, with a suggested price of $1098 fully equipped, was seen in an Iowa showroom carrying a $549 price tag. The reason, according to the sales manager of a large retail store, is that "some of the glamour seems to have disappeared from the glass boats." He explained that buyers now realize that, among other things, these boats are not entirely maintenance-free. A recent Harvard University research group substantiated this and then pointed out that fiberglas is "far from a 'wonder' material." The report said that the stuff sinks, is often flammable, and prone to serious flaws when major stresses develop from seemingly minor faults in the resin or in the laying up. On the other hand, the Committee of Aluminum Producers, a special promotional group for aluminum boats, predicts that sales will hit 140,000 in '61. Aluminum boat manufacturers expect to sell about 120,000 this year. The Boat Shows (early '61) will doubtless provide a tip-off for aluminum's future performance in the boat market.

A Heel Will Do It Every Time » » It's bad enough to be stepped on by a woman, but when she's wearing those stylish, stilleto-like high heels—look out! Floor panels of the Boeing 707 jetliners must be redesigned because of this latest fashion in feminine footwear. Concentrated pressure of the spike heels breaks down the honeycomb under the aluminum floor's upper surface. Next thing you know the floor is deeply dimpled. How Boeing will cope with this emergency isn't immediately known. The irony of it is that the fashion could be deader than the dodo next week.

Electrothermal Cooling » » Aluminum plate is used in electrothermal cooling units which will soon offer our Navy's submarines quiet, safe, refrigeration. And, according to the research lab of Whirlpool Corp., St. Joseph, Mich., such cooling will be applied to airspace and consumer products in the more distant future. Actual design and testing of coolers is at an advanced stage. Units are of modular construction, each component being a sandwich with one hot and one cold face. Positive and negative electrothermal power emanates from between the two thermal skins. Running water takes heat from the hot surface, while a cold surface extend into fins to enlarge the heat-transfer area. Wolverine Tube Div'n of Calumet and Hecla developed the finned surfaces. Extrusions and castings failed, but Wolverine licked the problem with a grooved aluminum plate filled with rolled aluminum strips locked in place by subsequent rolling of edges.

Pint-Sized Promotion » » An aluminum extruder has come up with a scheme that proves that you don't have to have the resources of a U. S. Steel or an Alcoa or a Reynolds Metals to develop new markets. The "Idea Kit" put out by Midwest Aluminum Corp., Kalamazoo, Mich., is simply a tubular cardboard container loaded with an assortment of small aluminum shapes. Midwest reasons that an aluminum extrusion can practically sell itself once it gets into the hands of a product designer or plant manager or company president; sends the kit to anyone requesting it on a company letterhead.

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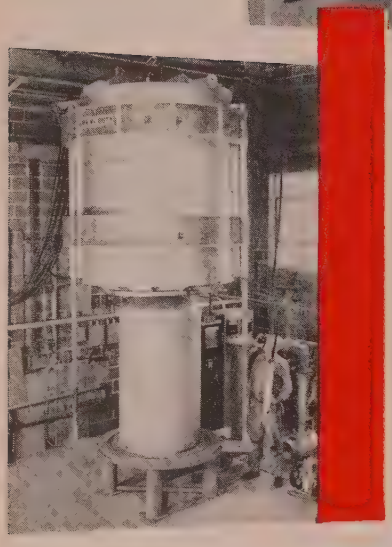

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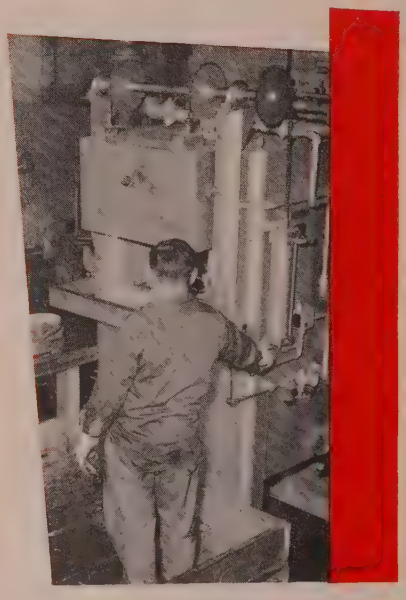

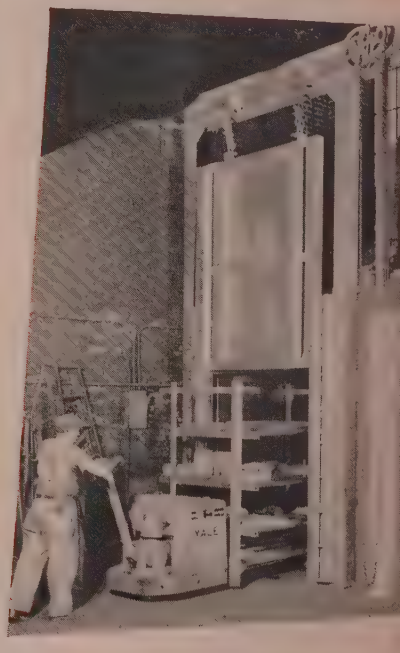

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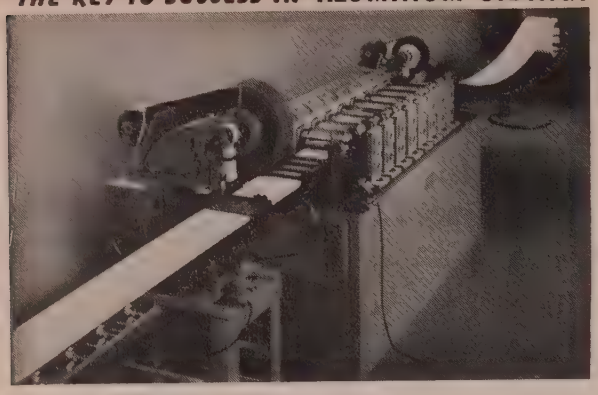

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Useful Data

Strip coating sequence and equipment are covered in bulletin RW-500 by J. O. Ross Engineering. Included is a diagram of the 17 stages in the strip coating line, pictures of each of the components used in every stage, and a description of what each unit accomplishes. Five advantages of the line are explained. For a copy, write Robert Hentschel, J. O. Ross Engineering, 730 Third Ave., New York 17, N. Y.

Paint stripper formulating service, and paint strippers in general, are discussed in booklet by Enthone. Strippers covered are for all types of air dry and baked synthetic enamels as well as printed circuit resists. Various strippers such as fast-evaporating, cold chlorinated, organic emulsion, hot alkaline and water-dilutable are detailed. Contact Dr. Walter R. Meyer, Enthone Inc., Subsidiary of Asarco, 442 Elm St., New Haven, Conn.

Die casting aluminum, magnesium, zinc and silver are detailed in a 600-page book, "A Visit to 500 Die Cast Plants." Sections cover furnaces, tools, gating theories, some tricks of the trade, nomenclature, etc. In all, there are 28 sections and 125 chapters. Book cost $10 plus postage and handling. Write Ed Day, American Charcoal Co., 201 S. Green St., Detroit 17.

Industrial furnace equipment for heat processing is covered in bulletin SEC-11 by Sunbeam. All units in firm's line are pictured and described. Also included is a selection guide for determining proper equipment to use for individual heat processing requirements. Booklet can be obtained from Richard K. Stephenson, Sunbeam Equipment Corp., Meadville, Pa.

Finishes for use on magnesium electronic components are covered in a reprint supplied by Dow Metal Products Co. Detailed are paint primers, chemical treatments, paint and plated finishes. Applicable government specifications, methods of applications as well as advantages and disadvantages of various finishes are also included. Write Clayton Dickey, The Dow Metal Products Co., Midland, Mich.

High pressure die casting machines are subject of 12-page booklet by Cleveland Automatic Machine Co. Models include 100, 250, 400, 650, 850, 1000 and 2000-ton units. Cold chamber casting of aluminum, magnesium and brass and hot chamber casting of zinc, lead and tin are discussed. Other details concern machine automation and vacuum die casting. Copy can be obtained from Glenn Miller, Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, Ohio.

Aluminum tubing reinforced at various positions along length for extra strength is explained in four flyers by British Aluminium. Tubes are reinforced with extra metal internally at one end, externally at the other. Tubes can also be reinforced internally or externally at one or more positions along length and

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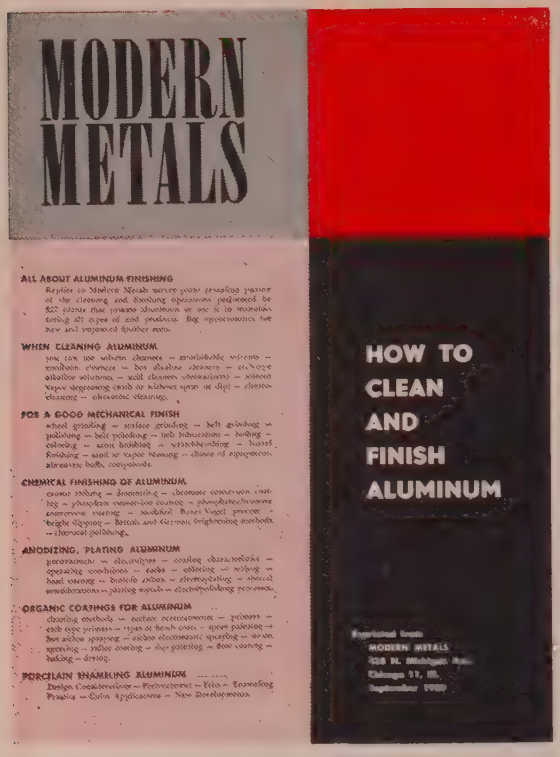

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internally with tapered walls. Tapered tubes are also described. Size ranges for special tubes are diagrammed and dimensions listed. For copy write G. O. Taylor, The British Aluminium Co., Ltd., Norfolk House, St. James Square, London, S.W. 1, England.

Extruded aluminum shapes are pictured in a catalog by Aluminum Extrusions Inc. Over 400 angles, channels, edgings, nosings, Tees and other shapes are shown. They are produced from open dies and the usual die charge has been eliminated. Information includes width, thickness factor and estimated weight-per-foot. For copy contact D. G. Maxwell, Aluminum Extrusions Inc., Charlotte, Mich.

Titanium anodizing racks that can be altered to accommodate wide variations in sizes or shapes of parts are detailed in Servi-Sure catalog 59-1. Covered are clip and box-type racking systems and standard racks — doublet and star fishbone, standard and modified utility models. Capacity of racks and typical applications are given. For copy write Ernie Rosner, Servi-Sure Mfg. Co., 131 N. Green St., Chicago 7, Ill.

Transparent colored finishes for aluminum are listed in pamphlet by Egyptian Lacquer. Finishes are applied to pre-treated aluminum by spray, flow or roller methods, then baked. Colors include red, green, blue, gold, brass, copper and clear. Advantages of product, called Epoxize, are discussed, and tests it should pass if properly applied are listed. For pamphlet, contact P. H. Beach, The Egyptian Lacquer Mfg. Co., Inc., P.O. Box 444, Newark, N. J.

Bracing unitized aluminum ingots for shipping is described step-by-step in booklet offered by Acme Steel. In the method, developed by Alcan, unitized ingots are shipped in box cars as controlled floating loads which absorb shock and keep units secure. Report U1-4 is available from R. J. Krieser, Acme Steel Co., 135th St. & Perry Ave., Chicago 27, Ill.

Inserting tool for installing small stainless steel wire standard screw-thread and screw-lock inserts is described in bulletin 770A by Heli-Coil Corp. New design, claimed to provide fast, precise installation, is explained and ways in which miniaturization was accomplished is detailed. Illustrated book also covers operation, disassembly and care of tool. For copy write Don Lee, Heli-Coil Corp., Danbury, Conn.

Alloys and chemical compositions in the Vancoram line are cataloged in brochure by Vanadium Corp. More than 90 ferroalloys, metals and chemicals are listed. Alloys are of aluminum, titanium, iron, chromium, columbium, manganese, silicon and vanadium. Silicon and vanadium metal and vanadium chemicals are also covered. Write Sales Manager, Vanadium Corp. of America, 420 Lexington Ave., New York 17.

Refractories are the subject of a new illustrated brochure prepared by Harbison-Walker. It covers source of raw materials, control testing, mining, quality control, and how refractories contribute to technological progress. Colorful production is obtainable from Robert R. Miller, Harbison-Walker Refractories Co., 307 Fifth Ave., Pittsburgh 22, Pa.

Electric and open hearth steel castings from 1 lb. to 100 tons.

Rolling on a PITTSBURGH Breakdown Mill at ANACONDA

As a major part of an extensive expansion program at its Terre Haute, Indiana plant, Anaconda Aluminum Co. has installed this PITTSBURGH 66-inch four-high cold rolling Breakdown Mill. This equipment produces aluminum strip with a minimum thickness of .012″ up to 60″ wide at a speed of 1,200 feet per minute to help meet the increasing volume of orders specifying exacting gauge tolerances and surface quality. The mill also produces foil stock for Anaconda Aluminum's Foil Division at Louisville, Kentucky.

Important design features of this PITTSBURGH mill include hydraulic roll crown control, special reel drives to provide added flexibility and strip gauging equipment for automatic gauge control.

For all your requirements in rolling mill equipment and related facilities, contact PITTSBURGH.

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Noiseless **gas valve** designed for use on all types of domestic heaters has die cast aluminum body. The Silent Knight is a product of White-Rodgers Co., 1209 Cass Ave., St. Louis 6, Mo.

The householder can save himself some home repair expense with a do-it-yourself **weatherstripping** kit made by Pemko Mfg. Co., 5755 Landregan St., Emeryville, Calif. Installation around doors, using the aluminum extrusion and multiple vinyl seal combination, can be made for one-fourth the cost of a professional job. "This weatherstripping should normally last as long as the building," the manufacturer states.

A new plant designed to double production facilities for **composite die sections,** and speed service, is being built by Ajax Composite Die Co. at 19181 Glendale Ave., Detroit. According to president K. J. Puffer, the 13,000-square-foot plant will be completed about Feb. 1, 1961.

One of the largest aluminum smelting plants on the West Coast will go into production December 1 when the new operation of Aaron Ferer & Sons gets under way at 3248 Long Beach Ave., Los Angeles. The $1½ million facility will have a capacity of 50,000,000 pounds of **secondary ingot** a year, general manager William Teller said.

A new research laboratory to serve the electrical industry will be built at Fort Wayne, Ind. for Rea Magnet Wire Co., Inc., an Alcoa subsidiary. Activities of the new laboratory will include improvement and development of **insulations** for copper and aluminum round magnet wire, investigation of insulations for aluminum sheet and foil strip conductor, and development of techniques and engineering data for manufacture of coils from round wire and strip conductors.

"Name-Stiks" are the modern replacement for metal **nameplates,** eliminate the need for drilling the product and affixing a nameplate with drive screws. Product of Allen Hollander Co., Inc., 385 Gerard Ave., New York 51, "Name-Stiks" are available in either flat or embossed metallic foils and printed in as many colors as required. These pressure-sensitive "Name-Stiks" utilize a permanent-type adhesive that, once in place, cannot be removed. They can be used on metal, plastics, ceramics, glass, wood.

Kawneer Co. has acquired certain selected assets of the Sun Valley **sliding door** line as manufactured by Sun Valley Industries, Inc. of Los Angeles, Calif. David S. Miller, Kawneer's Marketing vice president said the move "represents a planned step by Kawneer into the marketing of certain specialized types of residential building products, usable both in new construction and residential modernization." The new line will continue to be sold by the present Sun Valley sales organization, operating as part of a newly or-

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Cuts nonferrous metals without burr and at a high rate of production

For aluminum extrusions, billets, copper and brass bars, tubing, etc. Designed for precision performance.

Saw: 14" std. for 3" cuts; 20" max. for 6" cuts. Stroke: 28 per minute maximum for 6" wide material. Table is cast iron 15" x 48" with aluminum throat plate and opening with chute for automatic removal of pieces up to 6" long.

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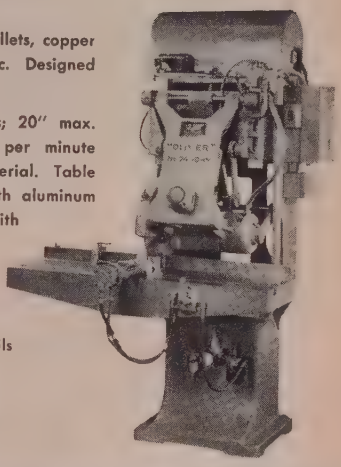

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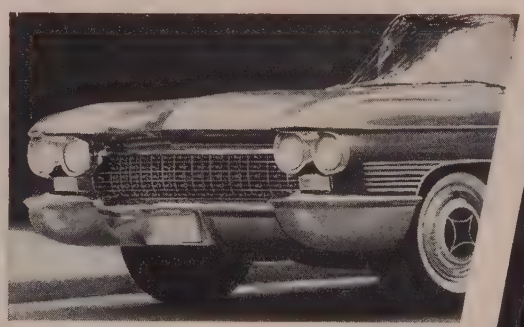

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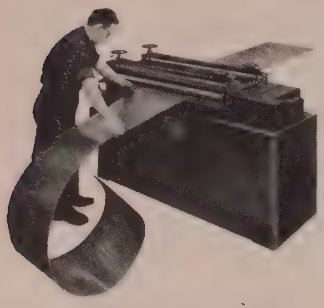

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ganized corporation, Sun Valley Industries, Inc., a wholly-owned sales subsidiary of Kawneer. Manufacture of the sliding door line will be transferred from its present location in the Los Angeles area to Kawneer's facilities in Niles, Mich.

Phifer Wire Products, Tuscaloosa, Ala., has opened a western branch plant in Covina, Calif. The new plant (Phifer Western, Inc.,) will be under the supervision of David Lockwood, vice-president and general manager. Offices and plant are located at 516 East Edna Place in Covina, a suburb of Los Angeles. The plant will be engaged principally in the weaving of aluminum **insect screen wire.** Entirely new looms and finishing equipment have been installed to assure production of top quality screening in all popular widths.

Hoffman-Odom Co., 2360 W. Dorothy Lane, Dayton 39, Ohio, makes poppet-type air **control valves** which use cast aluminum bodies, combining ruggedness with lightweight and compact size in both in-line and subbase mounted styles. These valves, for 5 to 200 psig service, are available with a variety of solenoid pilots including JIC types or with pilot heads for remote operation.

Boat hulls made of aluminum planking instead of sheet are being constructed by Avro Aircraft Ltd., wholly-owned subsidiary of A. V. Roe Canada, Ltd. Avro is building the hulls at its Malton, Ont., plant to fulfill a contract with United Marine Inc., Millville, N. J., who will have its Richardson Boat Div'n complete the luxury cruisers.

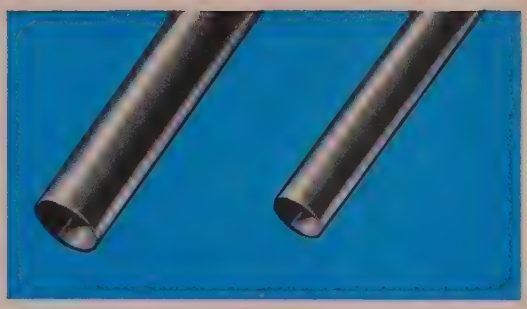
Production has begun in the recently completed **extrusion plant** of Texas Aluminum Co. at a site 10 miles west of California City, Calif. Samuel Saunders manages the 62,000-square-foot branch. Billet casting facilities and extrusion presses used in the manufacture of building products have been installed.

Architectural aluminum products will be distributed by Alcoa International Inc. through the world-wide network of distributors and licensees of Alukon International Ltd., which has become part of Alcoa. Alukon sells products and extrusions made by U. S. manufacturers.

The summer furniture line of Casualite has been purchased by Harris-Hub Co. from Novo Industrial Corp.'s Pennant Div'n. Casualite becomes a division of Harris-Hub, and has manufacturing facilities at the parent firm's Harvey, Ill., plant.

New quarters at 5755 Grant Ave. house the Cleveland branch of Copper & Brass Sales Inc. The new aluminum building is situated on a four acre site and covers 36,000-square-feet. It contains administrative offices and warehouse space.

Extrusion and other **ingot, and bar stock** for making aluminum conductor wire will be produced at Reynolds Metals Co.'s Longview, Wash. reduction plant



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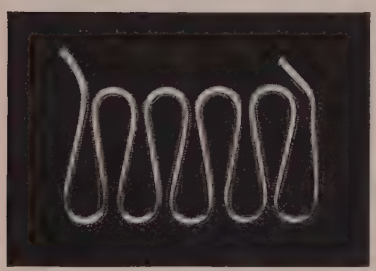

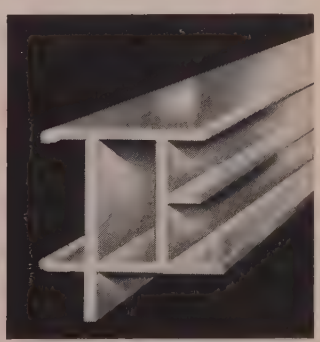

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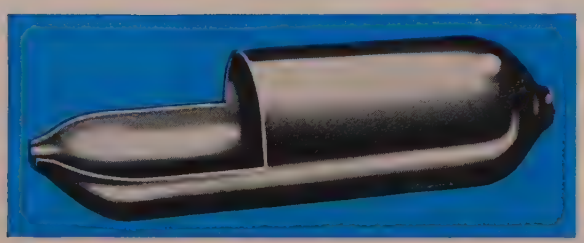
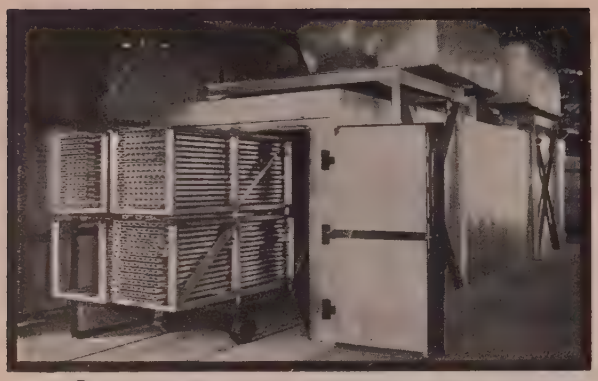


PLANTS IN DETROIT, MICHIGAN AND DECATUR, ALABAMA. SALES OFFICES IN PRINCIPAL CITIES



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when current expansion is completed. The $600,000 program includes 13,000-square-feet of additional work area, three new holding furnaces, a horizontal casting machine, saws, and homogenizing furnaces.

A completely **adjustable aluminum railing** for residential use was recently introduced by Versa Products Co., Tifton, Ga. The railing was designed for use with practically any type of architecture and is said to fit any platform and any size step. It can be used indoors and out.

Refrigerated display cases made almost entirely of aluminum are being produced by McKinney Mfg. Co., Muscle Shoals City, Ala. Built primarily "for the Ma and Pa stores," the cases are the closed type. Reynolds Metals' Colorweld aluminum is used on the exterior and is trimmed with diamond embossed gold anodized aluminum.

A new West Coast plant has been opened by Acme Metal Molding Co., producer of **store fronts and entrances.** The new facility is located at 645 National Ave., Mountain View, Calif.

A new die casting plant in Edison, N. J., was to have been occupied by Alcoa in October. The facility will replace the Garwood, N. J., plant.

The Safeway chain hoist has been lightened by replacing steel with aluminum wherever possible, says American Chain & Cable Co., Bridgeport 2, Conn. The self-lubricating unit comes in ½, 1, 1½, 2, 3 and 4-ton capacities. The smallest unit, with an 8-foot lift, weighs 35 pounds in aluminum, 41 in steel. Other units are similarly lighter.

Aluminum containers for army food are being produced by Landers, Frary and Clark, New Britain, Conn. The firm was recently awarded a $124,000 contract by the U. S. Army Quartermaster. This raised the company's total of government container contracts to over $700,000. Produced by the Stanley Div'n, the containers are double-walled aluminum with separate inserts. They will hold hot meals for troops on maneuvers.

In an effort to further diversify its operations, the Studebaker-Packard Corp. has purchased, for an undisclosed amount, D. W. Onan & Sons Inc., Minneapolis builder of **electric generating plants.** Terms of the purchase included cash, common stock and a share in future earnings. The new Onan Div'n will continue under its present management. This is the fifth company outside the automotive field Studebaker-Packard has bought.

A division has grown up! That's what Reynolds Metals Co. claims for its **decorative foil** firm which will be integrated with the parent company as of January, 1961. The division, under the managership of Harry W. Roth, was to distribute decorative foil in department stores, etc. Reynolds says the change will make better service possible. This revision has no effect on Arrow Brands Inc., still a separate company.

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REROLL REVOLUTION

Giant mill to produce hot rolled sheet stock will be built in northeast U.S. by Aluminium Limited in cooperation with Bridgeport Brass, Scovill Mfg., and Fairmont Aluminum division of Cerro de Pasco. Mill will cost $30 million; produce 100,000 tons of sheet stock a year. Modern Metals queried other rerollers; found disagreement on project's significance.

by F. L. Church, Senior Editor

COOPERATIVE integration, the financial strategy that has put two companies into the primary aluminum business, may prove to be the answer to the price squeeze problem for independent aluminum sheet mills.

Three nonintegrated custom-producers of aluminum sheet – Bridgeport Brass, Cerro de Pasco, and Scovill Manufacturing–revealed late last month that they will join forces with Aluminium Limited to build a big hot rolling mill which will supply reroll stock to their respective sheet mills.

100,000 Tons of Reroll

The joint news release issued by the four firms contained very little specific information. A new corporation, to be owned jointly by the four companies and operated by Aluminium Limited, will build a "semi-continuous" hot rolling mill with an initial capacity of 100,000 tons of reroll stock per year. It will entail a capital investment of about $30 million.

Neither the name of the corporation nor the location of the mill has been revealed, but it was announced that the mill will be built somewhere in the northeastern U.S., convenient to the rolling mills of all four participants.

These are at Warren, Ohio (Bridgeport Brass); Fairmont, W. Va. (Cerro de Pasco's Fairmont Aluminum division); Waterbury, Conn. (Scovill); and Kingston, Ontario (Alcan). They did not reveal when construction will begin, but completion of the facility is expected to take about two years.

Modern Metals has learned from a spokesman of one of the companies that contracts have not been signed as yet; that construction will begin next year and be completed in 1963; that the four participants will take equal portions of the mill's output; and that Aluminium Limited will contribute approximately half of the equity.

An official of another of the four participants confided that funds for the mill have been appropriated; that preliminary engineering has been completed; and that the mill will process rolling ingots shipped from Alcan's smelters. Remelt facilities will be be installed to process in-plant scrap, as well as scrap from the participants and their customers.

It was also learned that the breakdown mill will be a 120 to 144-inch unit, and that the facility will be designed to be expanded to an ultimate capacity of 300,000 tons or more of reroll annually. This, presumably, would be accomplished at a relatively modest additional investment.

Although the announcement noted that none of the participants "has sufficient hot mill equipment to supply expanding needs for reroll stock," the reasons for this unique cooperative venture go much deeper than that. For Aluminium Limited, it will open an important new outlet for primary metal.

■ *Giant reroll mill, to be jointly owned by Aluminium Limited and three independent sheet producers in U.S., will process rolling ingots, such as this, shipped from Alcan's primary aluminum smelters in Canada.*

Traditionally a supplier of aluminum to world markets, Limited is now encountering stiff competition from U.S. producers–particularly in Europe. Last year, the U.S. exported 121,000 tons of primary aluminum – an all-time high, and double the amount shipped abroad in '58. And exports continued to gain momentum this year, with about 150,000 tons of aluminum being shipped abroad through August.

Must Sell More in U.S.

Confronted with competition in its traditional markets overseas, Aluminium Limited is compelled to boost its sales in the U.S. With sheet and plate historically accounting for over half of total shipments of aluminum wrought products in the U.S., it makes sense for the big Canadian producer to make a determined bid for a sizable chunk of this business.

With a reroll mill on this side of the border, Limited will not only establish a foothold in the U. S. sheet business, but will also gain an efficient source of reroll stock for its mill products plant in Kingston, Ontario. This plant has a capacity of 33,600 tons of sheet and foil per year; also produces aluminum extrusions and forgings.

The bulk of Kingston's production is sold in Canada. Aluminum consumption north of the border is certain to increase in the next several years, and Limited will need more mill products capacity in this hemisphere if it intends to participate in this growth.

Finally, the remelt facilities in the new mill could enable Limited to purchase and process aluminum scrap from its customers in this country–an activity in which the U.S. producers have enjoyed an advantage over the Canadian company. This factor probably figured in Limited's abortive attempt earlier this year to acquire Apex Smelting Co.,

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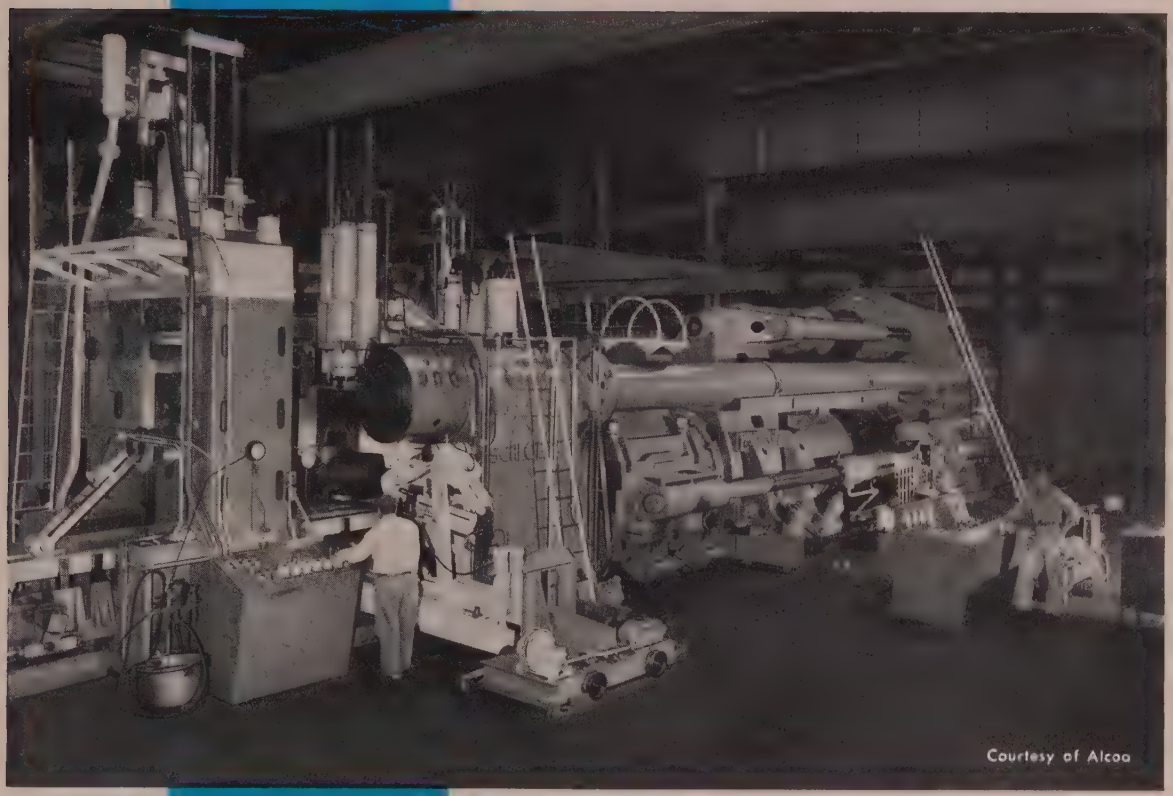

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The Department of Justice queered that deal, but the remelt (and presumably billet casting) facilities at the reroll mill would permit Limited to buy and reclaim customer scrap.

Stateside Members Get . . .

The economic benefits reaped by the three stateside members of the new cooperative venture could be considerable. The sheet mills of all of them depend, to some extent, on outside sources for reroll stock—the intermediate material between raw aluminum and finished sheet. The term "outside sources" refers, of course, to the primary producers, whose integrated rolling mills have a huge excess of reroll capacity.

But Bridgeport, Fairmont and Scovill —and other independent sheet producers as well — must also compete with the primary producers for finished sheet business. This is where the much-discussed "price squeeze" enters.

A brief look at recent price trends will clarify the picture.

Back in August, 1957, reroll stock (.125-inch thick; 17 to 60 inches wide) sold for 33.8 cents a pound. At the same time, coiled .020-inch utility sheet (the bargain sheet in those days) was tagged at 43.3 cents a pound (these are all book prices).

This left a 9.5-cent price spread between reroll stock (which most independent sheet mills must buy) and the lowest priced finished sheet. This, of course, is based on the perhaps questionable assumption that the lowest priced product is the one that swings the market.

A radical change in the picture occurred last year with the introduction of two supposedly new sheet products —duct sheet and building sheet.

Early in 1959, Kaiser Aluminum brought out duct sheet with the low, low price of 30 cents a pound for 36-inch wide coiled material in gauges .032, .025 and .019. Reynolds Metals matched the price and extended the gauges to .040 through .016 and the widths to 12 through 48 inches.

At the time, reroll stock was actually priced higher—about 32.5 cents a pound.

Tried to Limit Sales, But . . .

The producers tried to police the sale of duct sheet by embossing it "Aluminum Duct Sheet" through the length of the coil, and requiring their distributors to certify that they sold it only to the heating, air conditioning and ventilating industries. But there were complaints that the stuff would be used by product manufacturers to whom the independent sheet mills were selling.

Alcoa didn't enter the duct sheet rat race; brought out its own bargain basement product called building sheet. When this material hit the market in October '59 it was tagged at 35.5 cents a pound for coiled .024 and .027 sheet in 100,000 pound base quantities.

At the same time, the price of conventional reroll stock was trimmed to 30.7 cents a pound. This left a price spread of 4.8 cents between reroll and building sheet, compared with the 9.5-cent spread two years earlier.

Independent sheet mills griped that the situation was intolerable; that they couldn't possibly buy reroll stock at 30.7 cents, roll it down to specification sheet to be sold in competition with 35.5-cent building sheet without sustaining a loss.

The situation has improved since then. Alcoa later hiked the price of building sheet half a cent a pound, then gave it another boost three months ago when the prices of most mill products were raised. Today, building sheet averages about 38 cents a pound and 2S and 3S reroll stock is about 32.4 cents.

Vanishing Price Spread

Thus, the price spread which independent mills must operate on is in the neighborhood of 5.6 cents a pound—if building sheet is the product the independents must compete with. In this case, their operating margin has dropped from about 9.5 cents a pound in '57 to about 5.6 cents today.

(The foregoing review does not consider commodity priced items such as aluminum can stock, which was recently cut to 30.7 cents a pound or lower. It is assumed that independent mills are not able to service this type of market.)

Viewed in the light of these price trends, the cooperative reroll venture takes on considerable significance—not only for the three independents directly involved, but for other nonintegrated sheet mills, as well. As stated in the news release announcing the project:

"All four participants will look to the new plant as a source of aluminum reroll stock, and will benefit from the efficiencies of large scale production. . ."

There is no reliable way of estimating the cost of producing reroll stock on the new mill, but it is certain to be well under the present book price of reroll. The participants wouldn't contemplate the sizable investment involved if they weren't sure of reducing their costs.

Since the joint reroll project is sure to have a powerful impact on the entire aluminum sheet and foil business, we asked several industry authorities for their views on the development. As expected, their comments raised many interesting points.

The proposed reroll mill is "the most important single development affecting rerollers in recent years," observed the division manager of a sizable producer of aluminum foil.

Consider Sheet Casters

"Any reroller of any consequence has seriously investigated both the Hunter and Hazelett processes for continuous casting strip equivalent to hot-rolled sheet (but) has hesitated because of the volume required to justify the capital investment, as well as the rather severe alloy limitation . . .

"However, I am sure most of us have made no secret of our interest in these processes, and the answer (from reroll suppliers) has been: 'We cannot stand by quietly and see all of our reroll customers become pig customers. We have an investment in hot rolling equipment which must be protected.' "

From this, our informant drew the following conclusion: "Should a sufficient number of rerollers elect to install alternate equipment, the primary producers would reduce the price of reroll to a point where it would no longer be economical to operate a sheet casting setup.

"If the primary producers were sincere in their veiled threats to protect their hot rolling equipment investment," the foil man continued, "then certainly we can expect a significant reduction in the price of reroll stock. In view of what happened to fin stock prices in September, I would expect these reductions to be about 5 cents a pound."

The president of another foil company agreed that the new mill might force the price of reroll down. "Certainly the producers will be worried about the effect of this move on the price of foil stock—which, we assume, will become an attractive item to the three American partners as soon as the mill is in operation," he observed.

A siding producer in the east — one of the growing number of siding firms that roll their own sheet — does not expect the new mill to force a cut in the price of reroll. A spokesman for a highly diversified product manufacturer, one of the largest corporations in the country, agreed that there would be little effect on the reroll price.

'Not Much Market Left'

Out on the west coast, a producer of sheet considered the price factor a moot point. "I don't think there is very much of a market for reroll stock left in the U.S., particularly when you take these three sheet producers out of the market," he observed. "I am more inclined to think that the effect might be some readjustment of pig prices to meet this type of competition."

(Continued on page 34)

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And from a midwest producer of mill products came this comment: "I doubt that the primary producers will cut the price of reroll unless the new combine takes the lead and attempts to furnish stock to other independents."

'Prices Already Too Low'

This man also saw little prospect for a reduction in the prices of finished sheet. "They are already too low," he explained. "This move appears to be a protective one to enable these three mills to keep their heads above water."

The siding man concurred. "I don't think these four firms will 'trigger' any price reduction because their motive for entering the reroll business centers around the lack of profit between pig and the finished product," he said.

The west coast man was more emphatic. "Even with a concession on the part of Aluminium Limited [the new facility] will barely put these three companies in a position to break even on their sheet business," he noted. "I am sure they are all losing money on aluminum sheet at present. This is particularly true of building sheet."

In elaborating on his reference to the "concession by Aluminium Limited," this man suggested that the joint venture "is nothing more than a subterfuge for (Limited) to sell pig at a cut price in the American market. The economics of the program cannot be sound unless some sort of concession is made.

"For example, ingot sells today at 26¢/lb. and hot band is available at 30¢/lb.," he continued. "It is questionable if a plant in the U.S., operating on pig shipped in from Canada at 26¢, could produce hot band and deliver it to the associated companies at much under 29¢/lb. I certainly cannot see a $30 million investment based on a projected 1¢/lb. saving, so there must be more here than meets the eye."

When asked whether the proposed venture would have a good or bad affect on the aluminum industry, he remarked: "I hesitate to predict its ultimate effect . . . and, in fact, I hesitate to predict that the plant will actually be built."

The first foil man quoted above voiced a similar doubt. "I do not believe that the joint venture of the four firms will give them any significant competitive advantage — if, indeed, their plans to build a rolling mill are ever actually fulfilled," he said. "It would certainly seem that a timely reduction of reroll prices would preclude the building of this mill."

A mildly dissenting view was offered by the siding man. He considered the reroll mill plan "a wise move on behalf of their own business," and he doubted if the primary producers would reduce the price of reroll since it "would only mean that they would be trying to force this new competition out of business"—something that might attract the attention of the Justice Department's anti-trust division.

We asked all of these people whether the joint reroll plan would be good or bad for the aluminum industry.

'It Must Be Good'

"It must be good," declared one of the two foil men. "Whether fulfilled or not, its ultimate effect will be an increased profit margin for the reroller."

The other foil man agreed. "During the past few years the primary producers have been raising the price of reroll out of proportion to the price increase on finished products," he asserted. "I hope that this move will aid in the price of reroll without lowering the price of finished products so that a reasonable spread between raw material and finished products can be established."

A small reroller of sheet in New England had mixed emotions. "We cannot see that this will in any way spur the use of more aluminum sheet in tonnage markets," the president of this company said. "But there is a possibility that it will bring about a decrease in finished sheet prices in a market such as we have today.

"It is an excellent move for Aluminium Limited as it assures them a permanent market for ingot in this country and gives them an interest in an American fabricating plant."

The spokesman for the big products manufacturer thought the effect would be good "because it will keep aluminum a competitive product and therefore more attractive to consumers and manufacturers."

Finally, the man who spoke for a big mill products firm in the midwest foresaw the planned mill having a favorable influence "by perhaps reversing a trend toward fewer big mills. We think the best interests of the industry will be served by continuing in business, on a sounder basis, three mills of established reputation. Perhaps others may join up later to enjoy whatever advantages may develop."

The "others" referred to by this informant probably excludes most of the dozen or so independent rerollers who have jumped into the sheet business in the past year or two. The sudden growth of this branch of the aluminum industry has gone virtually unheralded.

There were only 6 independents ten years ago, and their 45 million pounds of sheet comprised barely 4% of the industry total. By 1955 there were some 15 independent rerollers who produced about 100 million pounds of sheet, or 7% of the total.

Today, there are perhaps 35 or 40 rerollers of all types. Their share of the market may never be known because many of them are strictly captive operations, producing sheet for their own products. But independent rerollers should account for well over 10% of the sheet business; perhaps closer to 15%.

Few of these newcomers could be considered likely customers for a big reroll supplier. Many of them make their own reroll stock by one of the several sheet casting processes. Many others buy relatively small amounts of narrow stock, which they reroll for awnings, siding, and the like.

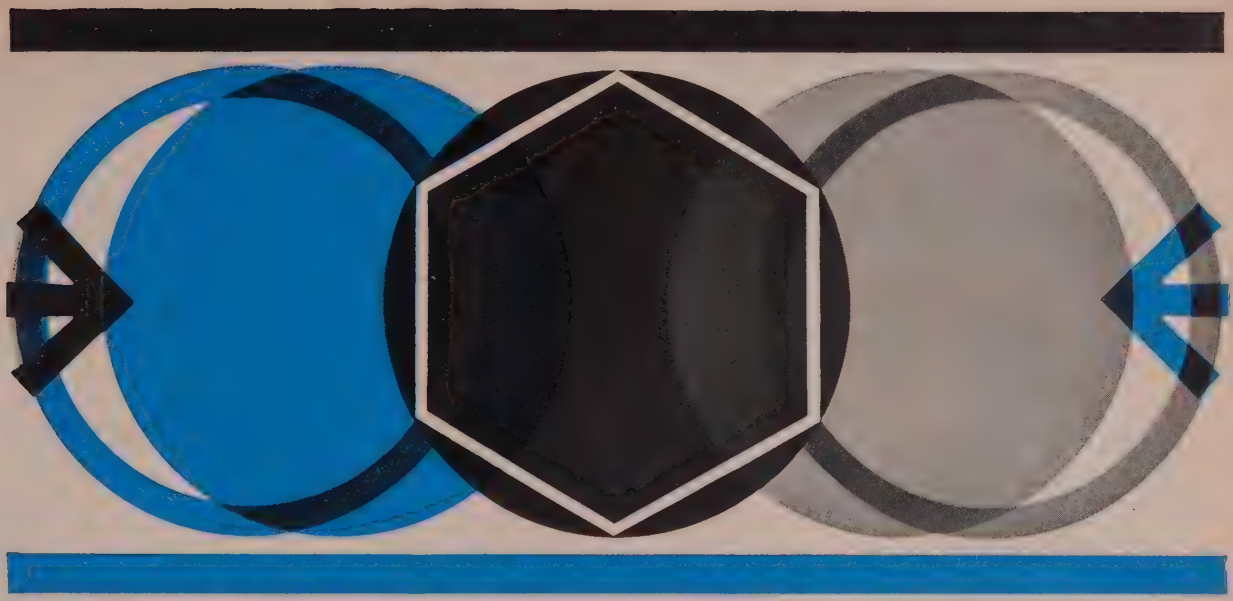
Like the Extruders?

But their very existence suggests the early stages of an industry upheaval reminiscent of the one that lured some 125 independents into the aluminum extrusion business since the end of World War II. The aluminum sheet business is on the threshold of a minor revolution that will open new sales opportunities for equipment builders and metal suppliers alike. This cooperative reroll scheme looks like one aspect of that revolution.

Shipments of Aluminum Sheet and Plate

(tons)

	1950	1952	1954	1956	1958	1959	Change (%)
TOTAL	514,065	495,894	528,742	755,167	680,383	858,023	+ 66%
Producers	491,456	472,129	496,950	693,982	615,467	776,851	+ 58%
Nonintegrateds	22,609	23,765	31,792	61,185	64,915	81,171	+260%



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Reason 2. A 30-hour homogenizing treatment gives the blooms a more evenly distributed, more uniform composition.

Reason 3. Blooms are scalped to remove all surface irregularities and defects.

Reason 4. All blooms are cleaned, etched, inspected and coated with a special lubricant.

Reason 5. Final product is cold-formed in a single, rapid stroke. This avoids deposits of heavy oxides on the surface, prevents cracking even complex alloys, eliminates rolled-in seams and laps, results in very fine uniform grained microstructure, gives remarkable working uniformity along length and surface-to-center.

Why not find out for yourself? Ask your local Olin Aluminum sales office or distributor for the names of firms in your area who have discovered cold processed rod and bar. Hear what **they** have to say. **Write for our brochure on Cold Processed Rod and Bar.**

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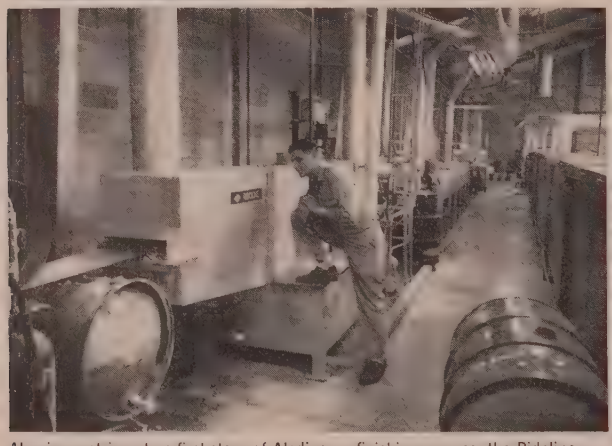
"Not one dime spent on Metal Products "for the Amchem-

CAMPCO's Executive Vice-President W. H. "Bill" Chapman sums it up—"Every time I turn around we save money in operations. Haven't spent a dime on maintenance on the new system, yet the coatings are more uniform by far. We've found that Alodine 1200S is what makes the big difference in roll coat operations." At left, "Bill" Chapman points out samples of CAMPCO-produced aluminum siding. Note Alcoa aluminum trademark and Alodine seal, both used prominently in CAMPCO's sales and promotional activities.



Aluminum strip enters first stage of Alodine prefinishing process, the Ridoline 34 cleaner spray chamber. Four of the five Amchem processing stages at CAMPCO are spray-type chambers.

This 27-foot long Alodine immersion tank is responsible for CAMPCO's dramatic increase in production and quality as well as reduction in labor, downtime, and fuel savings as compared to their previous all spray system.

Painted Alodine-treated aluminum strip, ready for shipment to commercial customers, is checked by Steve Wilson, Siding Department Supervisor, of Carolina Metal Products.

Alodine-treated end products at CAMPCO include aluminum reflectors used in street lighting. Many Alodized products are used in the nation's highway program—traffic signs, highway markers, license plates, etc.

Maintenance" says Carolina Designed Spray-Dip Process!"

New Maintenance-Free System for Aluminum Pre-Finishing Made Possible by Amchem's Alodine* 1200S

Dynamic Coating Process

They're making roll coating history down South, thanks to Amchem's Alodine 1200S! North Carolina based CAMPCO, one of the country's top strip processors, is gaining higher quality and greater output with a maintenance-free, Amchem-developed chemical conversion coating system for continuous-strip prepaint treatment of aluminum. Heart of the system, a 27-foot Alodine 1200S dip tank introduced into CAMPCO's former 5-stage Alodine spray metal preparation line.

New Design Cuts Operating Costs

The basic simplicity of dip tank design started CAMPCO off with a low initial capital expenditure and has resulted in significant day-to-day operating savings. The dip phase eliminates atomizing of strong acid materials and the need for pumping them through intricate piping systems, entirely eliminating nozzle clogging. In addition, machine exhaust requirements have been simplified and pump maintenance eliminated.

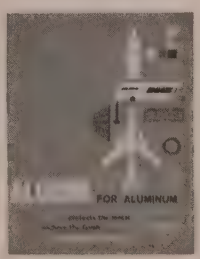
Savings Add Up

Additional CAMPCO savings with Alodine 1200S continue to pile up. Line speeds have been increased over 25 percent, fuel savings cut up to 30 percent, bath start up time greatly reduced. As "Bill" Chapman says, "I wish all of our problems were solved to the extent our prefinishing problems have been solved."

Join our growing list of satisfied users. If your product is made of aluminum—make sure it's protected by Alodine, the industry's standard and original prepaint treatment.

*Amchem's registered trademark for its aluminum chemical conversion coating.

Send for Booklet 1424A describing uses of Alodine for prepaint and protective treatment of aluminum.



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Amchem is a registered trademark of **AMCHEM PRODUCTS, INC.** (Formerly American Chemical Paint Co.)

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Deep Drawing Cans From Pre-Coated Sheet

A can company, a primary producer and a machine manufacturer have joined hands for aluminum's latest thrust at the tin-dominated can market.

A DRAWN shell and pull-off top comprise aluminum's latest bid for a chunk of the enormous can market monopolized by tinplate. This latest threat to tin's domination is a joint product of Central States Can Corp., Massillon, Ohio, E. W. Bliss Co., Canton, Ohio, and Kaiser Aluminum.

J. R. McCuskey, Central's president, predicts that the new seamless can and lid will take away some of tin's business merely because the aluminum cans will cost about the same as tinplate.

How can this be? First of all, aluminum used for canning is relatively inexpensive because of commodity pricing. Other economies result from the method of production. Capital cost of the line itself is about $300,000, which, says Bliss, is a lot less than normal can producing equipment.

High speed and low labor costs also save money. It takes only one operator to run the line and produce 200 to 240 cans a minute. Another important cost saving feature is that precoated aluminum is used. This eliminates a separate coating operation on formed cans.

Aluminum producers agree that certain economies can be gained from aluminum to offset any price difference in metal. The producers have been attacking with increased vigor of late — and the results are reportedly good.

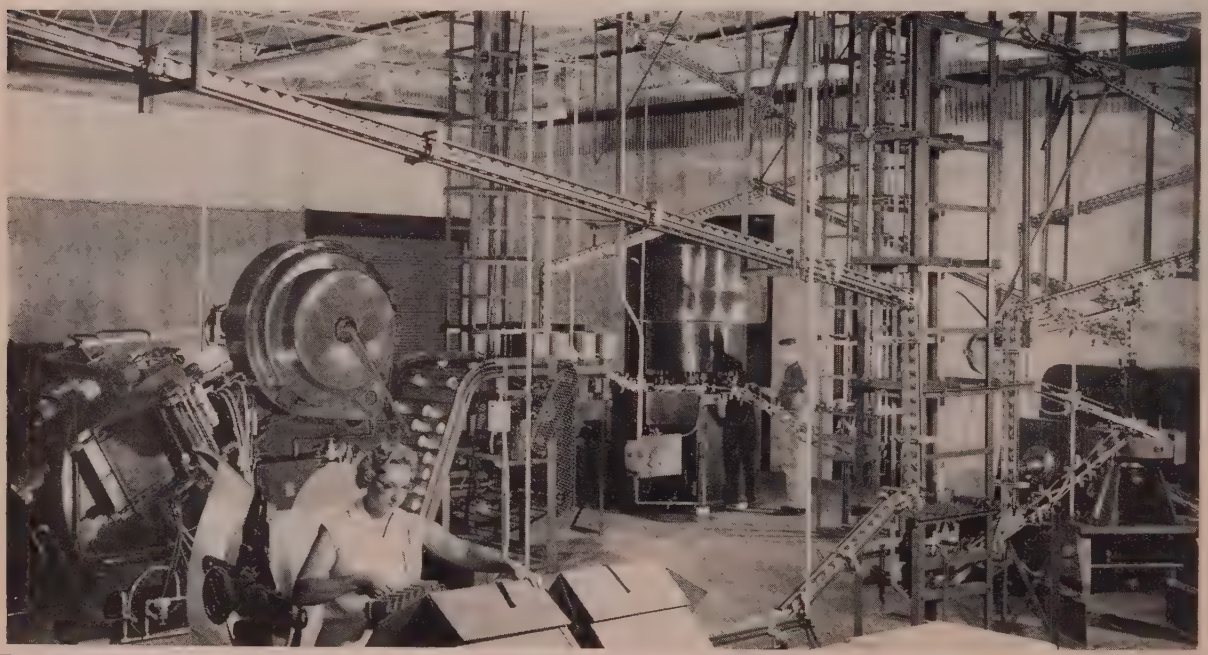
Without naming names, primary spokesmen have intimated that some breweries will announce shortly their plans to use aluminum containers, while other industries will be switching to the new quick-open lids to cap tinplate cans as well as aluminum cans. It is also expected that most of the tuna fish canned in the west next year will be packed in aluminum.

The primary producers have their sights set on at least 10% of the canning market within the next five years. This would mean about $200 million in business. Also, Alcoa sees the day when 250,000 tons of aluminum will be used to make can ends alone — this total representing what will be needed to cap every can made in the country, whether it has a tinplate or aluminum shell.

Can ends are making big news lately, and may bring about the demise of a heretofore staple household tool — the can opener. Alcoa recently announced an all-aluminum lid that has a tab ultrasonically welded to the top. By pulling the tab, a thin scored strip of metal is torn out, taking the top with it (see MM, Sept. '60, p. 95).

The new lid produced by Central States has a tab which is placed at the side of the can. By pulling this tab a thin strip of aluminum is removed from the seam where the top is attached to the body. The freed lid can then be lifted out. Because it has a countersunk shape, it can be replaced to serve as a tight-fitting plug.

This opening principle can be adapted to a round aluminum can or the aluminum lids can be used on contain-



■ *Overall view of Central States' fully mechanized can line. Machine at left is draw press, unit in center background is redraw press, and trimmer and flanger is at right. Note compactness of line. One worker runs the entire line.*

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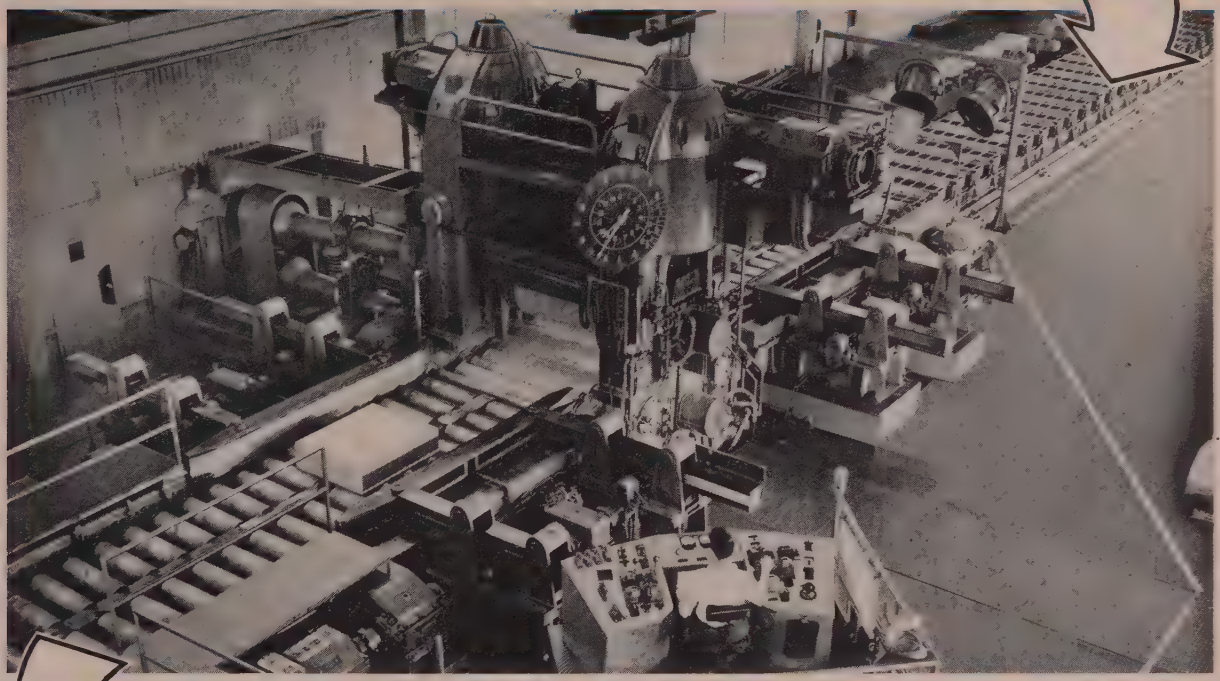

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ers of other materials. However, the new lid is not yet designed to take pressures such as needed for carbonated drinks, so it will be used on products for which pressure is not too important.

Can lids are made by normal procedures from 5086 aluminum alloy that is 0.010-inch thick.

The Central States can line produces three basic sizes of containers. These include cans 2½ inches in diameter and 1½ inches tall; 2½ inches in diameter and 2½ inches tall; 3-7/16 inches in diameter by 1-13/16 inches tall. Special equipment can make the latter diameter can 3⅜ inches tall.

Production equipment was manufactured and installed by the Bliss Container Machinery Div'n. The entire line consists of three major units.

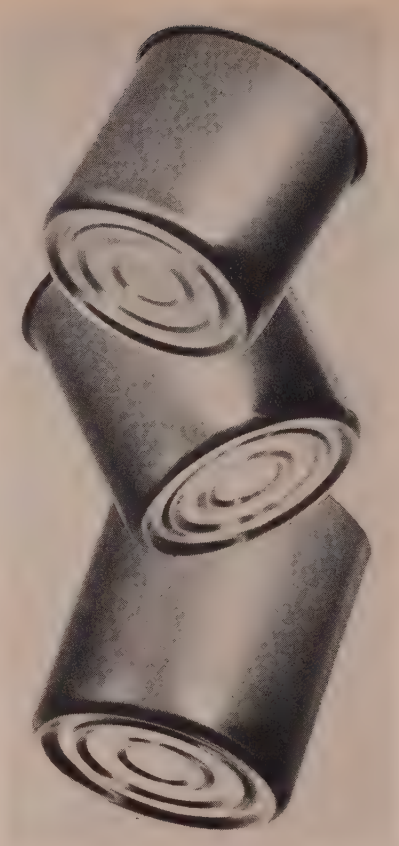
60-Ton Press Comes First

First machine in the line is a 60-ton single crank press on permanently inclined legs. It blanks and draws a cup from vinyl-coated aluminum coiled can stock at speeds between 65 and 70 strokes per minute with a 3-cavity die.

Kaiser supplies the 5052 aluminum in gauges from 0.06 to 0.016 inch and in coils up to 18-inches wide. The gauge remains the same during both draw and redraw.

Each coil used is coated on both sides, so resulting cans have a buff or white interior and a clear exterior, though a color can be used. Each coil leaves a skeleton weighing about 18 to 22% of its original weight. This scrap is reclaimed, and Central States says the coating causes no problem in this area.

Randomly discharged cups are then aligned in an open-end-up position in an unscrambler, and then conveyed to a rotary redraw press. Great Lakes Co. manufactured the unscrambler and the automatic overhead conveyors used to transfer pieces from stage to stage.



■ *Three stages in production of 2-8/16-inch diameter easy-open can. From bottom to top: Cup as it comes from redraw press; cup with trimmed and flanged edge, and finally, curled edge.*

Bliss engineers claim the redraw press is the first of its kind. It is a four-station cam-operated unit that works at 50 rpm or more. Cups are picked up by a star-wheel, placed in the die and drawn to final depth and diameter. Cans are then conveyed to the next station. By adding four more heads this unit can handle 400 cans a minute.

Redrawn cups are then conveyed to a combination trimmer and flanger, a six-spindle machine which operates at 33-1/3 rpm or faster. The spindles rotate as well as the turret that holds them.

Can bodies are fed by a star-wheel to the spindle head and are held in position by a vacuum. Two knives cut the body almost to the trim line and, as the turret rotates and knives recede, trimming cutters come up and slit off excess stock. The body then moves forward and is flanged, then is discharged, packed and shipped.

All drawing of 1½ by 2½ inch can bodies is done the first time, so the cups bypass the redraw press.

Cans to have a tear strip top require another operation. Units are conveyed from the trimmer-flanger to a rotary machine which curls the flanges of the can so the lid can be crimped to the body.

The resulting empty can weighs only one-third as much as similar tinplate containers, claims Central States. Also, the filled aluminum cans are 8 to 40% lighter than filled tinplate or glass containers having the same volume, depending on product density.

Other advantages: Because the can is drawn, side and bottom seam leakage is eliminated. Also, excellent nesting characteristics, with a recess in the lid fitting the bottom of the can above it, making stacking easy.

The use of precoated aluminum and the specially developed Bliss equipment gives can manufacturers some great advantages, but also sets up a limitation. The equipment was designed so that the can is drawn to its final height, not ironed as with other aluminum drawing methods. (The elimination of ironing preserves the metal's coating).

Drawing Limits Can Depth

But drawing restricts the shape of the can body since the depth of draw cannot exceed the diameter of the can. For this reason, the can could not be used to package those products which require deep containers, such as beer and soft drinks.

What will be canned? Testing programs conducted by Central during the past year indicate the new can and lid may be used for solid products such as fish, potted meats, cheese and dried foods, etc.

Though the firm would not reveal any names, it did indicate that some large volume users of the cans had already been contracted.

Central seems to have some new ideas for cans, too. President McCuskey says, "Don't be surprised if you see wearing apparel in aluminum cans on supermarket shelves. We're working on some final details now."

■ *Tab is pulled to free easy-opening can lid. Tear strip was designed to leave no sharp edges, and so lid could be replaced to plug can opening.*

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Six feet of white prints per minute.
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BENDING ALUMINUM

Strip, Plate, Shapes, Tubes

In this second article of a series, procedures for roll forming aluminum strip, and bending plate, extrusions and tubes, are detailed. Various bending methods are covered including roll, draw and ram bending, etc. Information was supplied by Aluminium Development Association, London, England.

BENDING the various forms of aluminum, as other metals, requires specific technology specially developed for the alloy and form in question and the ultimate shape desired. In this article the methods of bending aluminum strip, plate and tube are discussed

Continuous roll forming is a cold rolling process for lateral bending only. Careful planning and much experience are needed for the development of roll shapes. There are no set rules, but the following principles have been found satisfactory.

The flat strip width is developed in the usual way. A pitch line (a horizontal guide line used as a basis for the pitch diameters of each pair of rolls) is set near the lowest point of the shape to be produced. The line should extend from the first to the last roll.

A vertical pitch line is also set to intersect the horizontal line and establish the dividing line between the bends and bending loads on either side.

As a rule, bends should be upwards. Aluminum should be cold rolled gradually to avoid excessive strain. For this rolls (from 2 to 16 sets) are arranged in series.

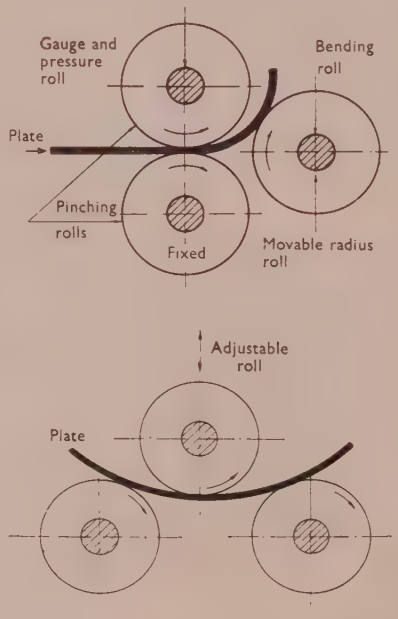
Make a Shadowgraph

A shadowgraph (above) should be drawn to show the progressive bending planned for each stage. This is then studied to assess the bending at each stage and the provision of maximum contact between the sheet and the top and bottom rolls.

Too many stages increase tooling costs, but too few may result in elongation of material between stages, with disastrous results. Allowance for springback is made by overbending in the last stages.

Rolls must be highly polished and free from sharp edges. A lubricant is often necessary. When rolling from flat strip it is best to use straightening rolls before bending to prevent excessive bow; these may also be necessary after bending. A tolerance of ± 0.005 inch can be maintained on finished sections.

Different materials may be rolled in combination with aluminum. Numbered, printed and embossed designs may be incorporated in the rolls to decorate surfaces.



■ ***Figure 1: Top drawing shows pinch rolls. All rolls are of the same diameter. Two front rolls adjust for thickness of metal, third roll adjusts to degree of bend. Pyramid rolls (bottom) have equal diameter rolls at bottom, larger roll at top.***

Plate usually has a slightly lower quality surface finish and wider tolerances than aluminum sheet. By definition, plate is material 0.125 inch thick and thicker. (In the U.S., material is considered plate if it is 0.250 inch or thicker.) But for present purposes material thicker than is commonly used for lighter sheet metal work will be referred to as plate.

The minimum practicable working radius for any plate material can only be determined accurately by trial under the actual conditions of bending. It will vary with the nature of the bend (i.e. width of plate, thickness, direction of grain, period after production), type of equipment, design and condition of tools.

First, Cut to Size

Plate is usually sheared or sawed to size before bending, with care taken to produce smooth edges. To prevent failures on critical bends plate edges should be filed or ground to remove burrs, cracks and any imperfections. It is often advantageous to chamfer the outer edges of thick plate before bending.

When bending welded plate it is sometimes best to work the weld metal to improve its properties. Hammering is the usual method, followed by wheeling (used for sheet and light plate) or rolling to smooth the weld and partly restore the strength of the softened metal adjacent to it. Working must be heavy enough to affect the weld metal throughout its cross section.

It may be necessary to machine off any weld reinforcement or chip or grind the weld surfaces before bending. Grind at right angles to the axis

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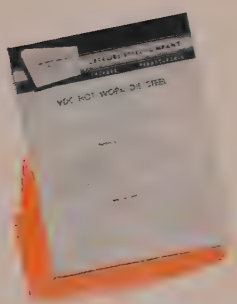

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of the weld must be careful to brush off particles of metals or abrasives so no foreign material is pushed into the surface of the part during bending. Flux, if used must be completely removed before working the weld.

The bending of plate on a press brake is basically the same as bending sheet and strip. It is limited only by the capacity of the press in relation to metal thickness and load required. As the metal thickness increases, so does the distance between the inner and outer surfaces of the bend, resulting in more stretching and compression with increased risk of failure.

There are two types of roll bending equipment—pinch rolls and pyramid rolls. Both are three rolls but differ in their method of operation.

Pinch rolls (top illustration in Fig. 1) are of the same diameter and usually geared to give the same linear bending speed and positive rotation. The two front rolls are adjustable for different thicknesses of material, the third roll is adjustable to the degree of bend required.

Nearly True Cylinders Made

This roll arrangement enables nearly true cylinders to be made in a single operation. The slight flat on the leading edge of the plate can be reduced by first reversing the rolls and feeding the flat past a little way into the back of the machine. After preforming the edge, bending can proceed normally.

The first two rolls "pinch" the plate and give good control during bending. The operation is quicker than if pyramid rolls are used.

Photo by Alcan Industries, Ltd.

■ *Fig. 2: Horizontal type three-roll bending machine. Top hat sections are shown being bent to form roof members of vehicle bodies. Unit operates similarly to pinch and pyramid used for plate.*

Pyramid rolls (bottom of Fig. 1) have two rolls of equal diameter mounted side by side which rotate in the same direction. The third roll, above, is larger and adjusts to control the radius of bend. Pyramid rolls tend to leave more flat surfaces than pinch rolls, but this may be reduced by rocking the plate between the rolls or by pressing.

The extent to which flat surfaces can be reduced by the methods described depends largely on the stiffness of the material, the center distance of the rolls and the diameter of the finished work. It may be necessary to preform the edges in a press.

In all roll bending operations it is essential to keep the rolls scrupulously clean and free from surface marks to avoid marring plate surfaces.

In bending extruded sections, the same conditions of tension and compression prevail as in bending other forms of aluminum. Other factors affecting the bending of extruded sections—in addition to the behavior of alloys and temper—are: Stability of section form; width depth dimensions; use of restraint during bending; acceptable amount of distortion; surface condition.

The geometry of the profile may influence the bending operation nearly as much as the choice of alloy and its condition.

Aluminum alloys are generally more ductile in compression than in tension and as the metal thickens under compression, clearance is necessary between the tool and the material. This makes a little buckling unavoidable, especially in thinner sections.

Defects—Under Tension

Defects are more likely in locations under tension than in those under compression, although the standards of acceptance for general work are often sufficiently lenient to make failures rare.

"T" bars are stable when bent in the plane of the web and do not usually require restraint by tools or fixtures to prevent transverse distortion.

Angles, channels, "Z," "top-hat," and "I" sections tend to distort and therefore require closely fitting tools and formers to minimize this. These shapes, as well as more complex ones, may be satisfactorily bent with ordinary tools, but supplementary mandrels, guide bars, loading snakes and preforming, may be necessary to counteract secondary bending effects.

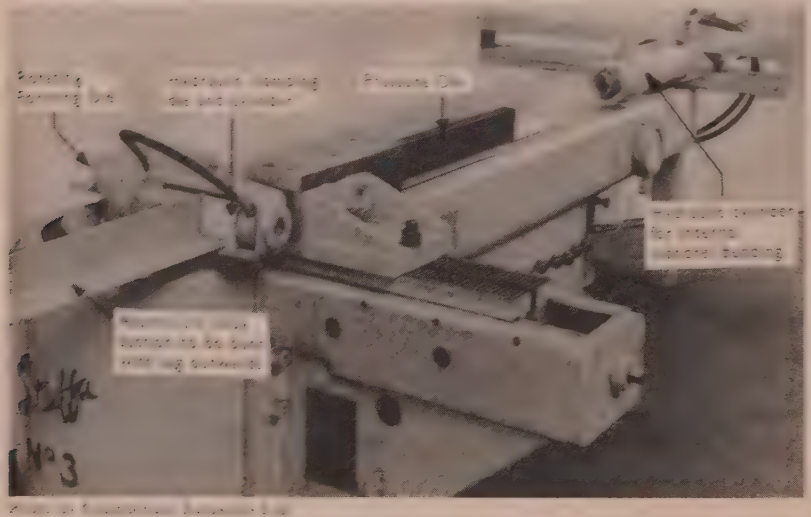
The radius of bend for any aluminum alloy and form and size of extruded section is governed largely by the amount of distortion that can be tolerated from the bending operation. They are best determined experimentally, so definite recommendations of minimum bend radii cannot be given.

Roll Bending Sections

Roll bending machines for section shapes operate on principles similar to the pinch and pyramid used for plate. Machines are of two types—vertical and horizontal (Fig. 2)—used according to the plane in which bending is to be done. The rolls are, of course, contoured to fit the shape of the work.

Roll bending machines will bend sections to any radius above a set minimum and to any desired length of arc up to a full circle, or a continuous helical coil.

These machines are, however, comparatively slow because control of the section is limited. It is often necessary



■ *Figure 3: A hydraulically operated bending machine for bars, sections and tubes. Bending die is shaped to receive that portion of part which is to be the inside of the bend. Entire assembly then rotates against pressure die (indicated above) which can be fixed or movable. Pressure die holds free end of part, making sure that metal movement is in a straight line. Fine increments of adjustment are available on pressure die. This draw bending machine may also be used for left hand bending by reversing the pressure die bracket.*

aluminum replaces steel for railroad cars

This section is an aluminum extrusion 82 ft. long by 25 in. wide. It replaces steel for the side of a railroad gondola car.

These are the advantages gained with structural aluminum:

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2. Dead weight of car's superstructure is cut by 50%, thereby increasing payload.
3. Shipping, handling, and fabrication costs are reduced considerably.
4. Tooling costs for aluminum extrusion dies are less than the costs for steel rolls.
5. Aluminum shapes are extruded in one operation complete with interlocking web stiffeners.
6. Aluminum will not rust. Sections and joints retain original strength and dimensions.
7. Aluminum is non-sparking.
8. Aluminum resists corrosion without maintenance.

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to pass work through the rolls two or three times, using templates as a guide, so that bending may be done in easy stages.

Draw Bending

In draw bending (Fig. 3), the bending die is shaped to receive that section of the part which is to be the inside of the bend. A clamp, shaped to suit the remaining section of the part, holds the work securely to the die. The whole assembly then rotates against a pressure die which is shaped to take the outside of the part to be bent.

The pressure die, which may be fixed or movable, restrains the free end of the part, confining the movement of metal to a straight line. The part is thus "wiped" into the bending die as it rotates.

Most simple hand bending machines are of the wrap or radial type (Fig. 4). A bending die—shaped to the contour of the part to be bent—remains stationary, while a "shoe" or "wiper" block is held firmly against the part by a roller which is mounted on a bending arm. This arm is rotated around the stationary bending die pushing the part into it. This is also called compression bending.

Ram bending is the simplest method. A part is bent between two fixed supports on which are mounted dies (shoes) shaped to suit the outside contour of the part. A central bending former, also shaped, is mounted on a hydraulic ram.

As the ram moves forward, the two dies swivel on their fixed supports. No clamping is needed because the part slides over the dies during bending. The process is particularly suitable when several bends in different planes are required on a single length of material.

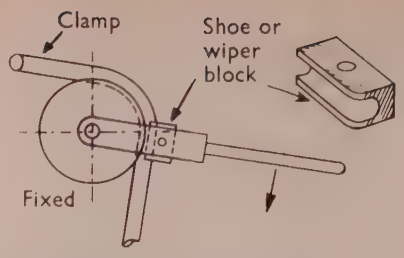
Bending Tubes

In tube or pipe bending, the same principle applies as in bending solid sections (the outer wall is stretched while the inner wall is compressed). But tubes are hollow so there is a tendency for the outer face to flatten and the inner radius to wrinkle.

Successful bending depends largely on the required bend radius, the angle of bend in relation to the wall thickness/diameter ratio, and the conditions of bending.

Bending may be: Free, without support; with external support only; with internal and external mechanical support; with filler material and external support; with filler material only.

Thick walled tubes behave as solid round bars when bent, with similar results. Medium thick walled tubes will tend to flatten, and thin walled tubes will tend to buckle and flatten, depending on the condition of bending. The

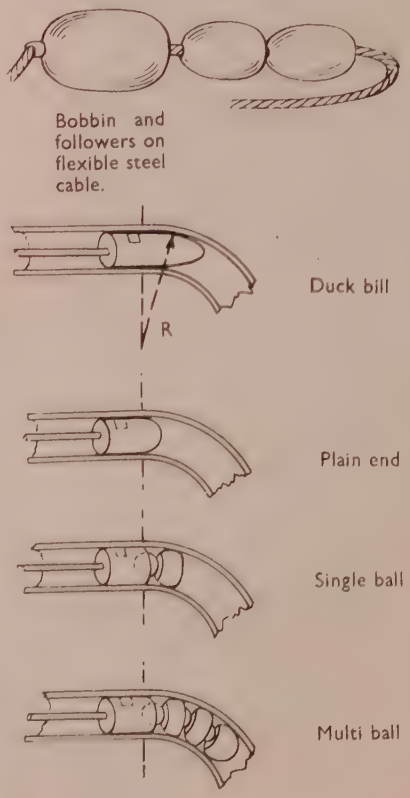


■ ***Figure 4: This is the simplest of the hand bending machines — the wrap or radial type. The die remains stationary while a shoe holds the part against the die.***

choice of method may be determined by the amount of flattening, ovality and wrinkling acceptable.

Bending techniques for tube are basically as already described for sections, but the procedures mentioned are necessary to ensure smooth, accurate bends.

The minimum bend radius for any diameter of tube depends on the material, diameter and wall thickness, and also on the type of equipment used and the support given to the tube during bending. No definite recommendations for bend radii can be given.



■ ***Figure 5: Five examples of flexible "snakes" which aid in bending small diameter tube. The "snakes" help to prevent flattening and give best results when bending tube around a fairly large radius. The duck bill is one of the best because it extends into the tube beyond the point of bending, as shown.***

Small diameter tube can often be bent by hand without support, but a flexible steel spring around the outside, or a flexible "snake" inside, helps to prevent flattening and give good results for bends of fairly large radius (see Fig. 5).

Of the solid mandrels, the duck-bill type is one of the best because it extends into the tube beyond the point of bending. The end is shaped to suit the desired radius of bend on the inside of the tube and holds the wall against the strain of bending.

The mandrel must be accurately positioned in the tube so that its point of curvature is in line with the centerline of the former. If it is in front of or behind the immediate point of bending the tube may either flatten or break.

Squares, Other Shapes . . .

Square or other shaped tubes may be bent in a similar way using a correctly shaped mandrel. Mandrels form an integral part of bending equipment and are precision made to allow proper clearance during bending. They should be highly polished to minimize friction.

Filler materials are best avoided if possible due to their cost, difficulty of removal and equipment necessary for their use. But if used, they should be easy to insert, offer sufficient support to the tube walls during bending, and be easily removed. They must not, of course, harm the tube material, and must be free of voids which might cause premature tube failure.

Common filler materials are sand, resin, or a mixture of 75% pitch and 25% tallow. A proprietary metallic filler suitable for difficult bends and for thin walled tube becomes fluid at 158°F and may be liquefied by heating in boiling water.

The alloy expands approximately 0.006 inch/inch during solidification and will reveal any weak point in thin tube. Handling arrangements are usually necessary due to the weight of loaded tubes.

Filler Removal Difficult

The complete removal of filler material after bending is difficult and filler is not recommended for tubes where internal cleanliness is essential—refrigeration tubing, for example. Water or oil under pressure may be used in such cases.

Liquid pressure inside a tube is exerted radially and equally at all points on the surface and any tendency for collapse is opposed. The pressure should be maintained during bending. However, liquids have no shear strength, and extra restraint must be given by formers which enclose the tube at the point of maximum bending moment.

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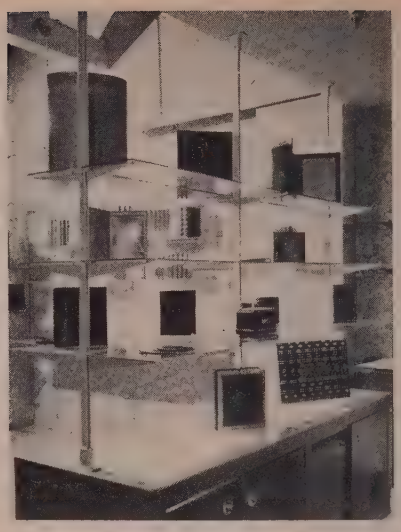
Extruded I-Beam Simplifies Design Of Shelving Hardware

One length of extruded aluminum shape makes two brackets for system developed in Sweden.



KEY COMPONENT in a line of heavy-duty shelving is an extruded aluminum I-beam which simplifies product design and reduces manufacturing cost. It provides another example, albeit a simple one, of an extrusion's superiority over the "built-up" section.

Licensed manufacturer of the standards and brackets for the shelving system in the U.S. and Canada is Designware Industries, Inc., Minneapolis 21, Minn. The shelving was originally developed in Sweden.

The Minneapolis firm specializes in producing Stylmark interior decorative hardware for glass, designed primarily from aluminum extrusions, and sold to manufacturers and glass jobbers. It is sold in either stock lengths for customer fabrication, or is bought cut to size and fabricated at the factory.

Color Anodized Shapes

The standards and brackets for the shelving system are called Tee Bracket. They're produced from 6061-T6 alloy extrusions in satin anodized finishes of natural, gold, and black. Brackets from 6 to 16 inches wide are cut from the I-shaped extrusion which is 2½ inches wide with a 1-inch flange (see diagram). Metal thickness is 3/32-inch.

"Extrusions are ideal in this instance because multiple sizes can be cut from one shape with a minimum of waste," said R. J. Brink, president of Designware Industries.

In the fabrication process, the I-beam is first cut to length at a 10° angle on both ends. A diagonal cut is then made along the length of the shape, producing two brackets from one length of material (see illustration).

The vertical profile of the bracket blank is punched to remove material and provide notches to lock the bracket in the channel upright. The horizontal profile is stamped to develop area of contact within the upright channel to retain the bracket in position.

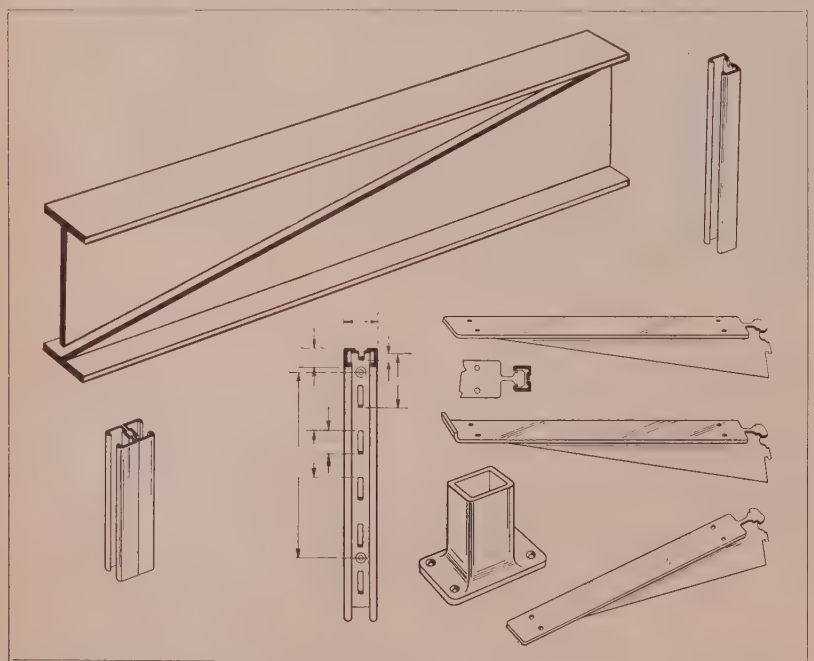
Two holes are punched in the top flange to receive rubber grommets for glass shelving or to provide screw holes for securing wood shelving.

If Made of Sheet . . .

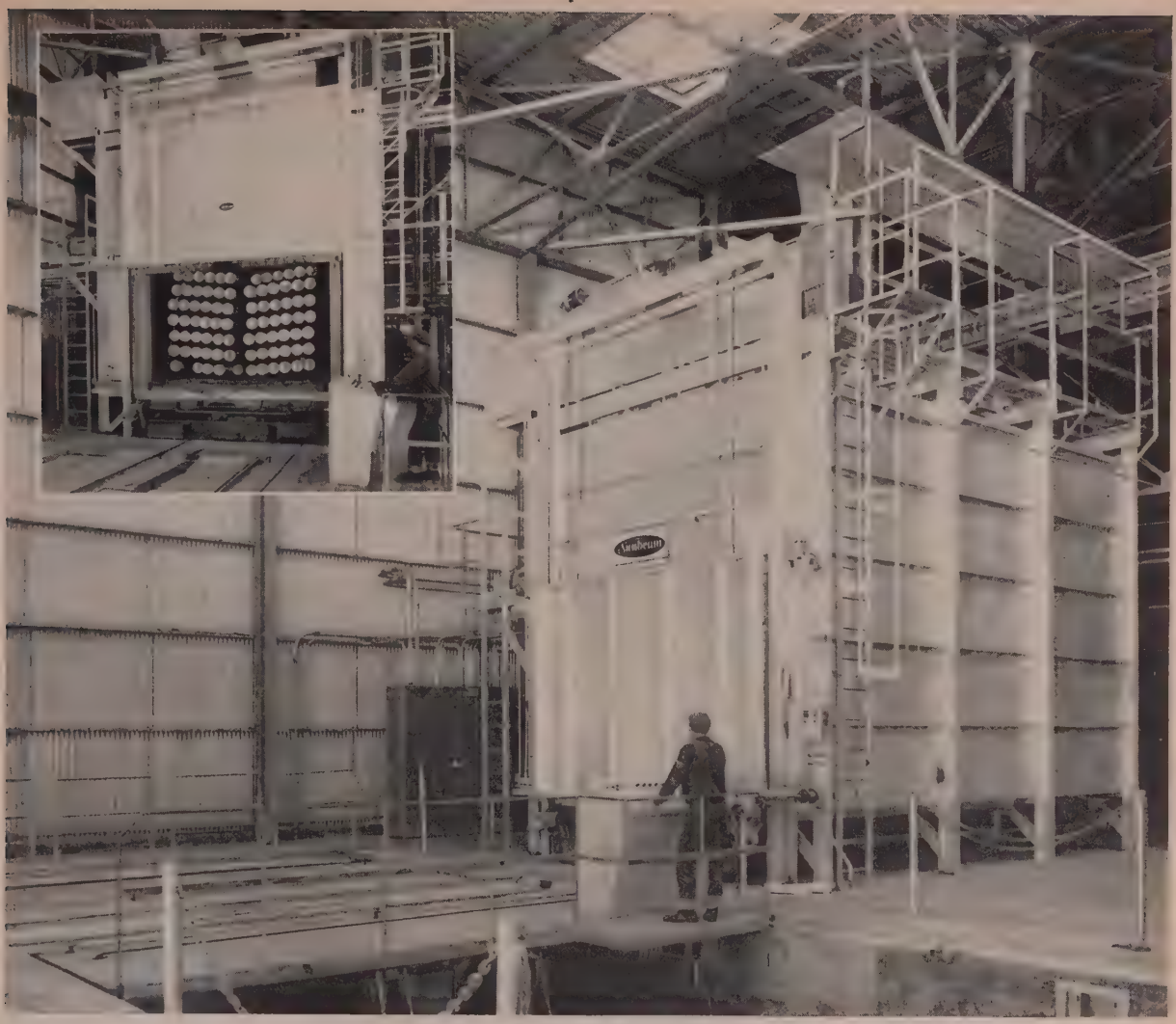
If the brackets were produced from flat sheet stock, according to Brink, additional stamped clips would be required on the top knife edge of the bracket. "Extrusions obviate this," he pointed out.

The opposite end of the bracket is punched with two additional holes, and when brackets are produced for glass shelving (identified as Type B) the end is formed upward 90° in the same operation. Brackets are then belt sanded to round off sharp edges and anodized in desired finish.

Tee Brackets offer the designer and user a new lightweight shelf hardware for wood or glass with heavy duty loading strength, according to Brink. He pointed out that 12-inch shelves mounted on 36-inch centers will carry up to 600 pounds.



■ ***Whether for home, office or store displays (above), Designware Industries' Tee Bracket makes a fast erecting shelving system. Below are line illustrations of all components. Large drawing in upper left of grouping shows how a simple I-beam cut diagonally through its length, produces two bracket blanks. Also shown are finished brackets, slotted standards which take the brackets, and die cast holders for standards.***



Sunbeam Aluminum Homogenizing Furnace, Kaiser Aluminum & Chemical Corporation, Chalmette Works, La. Inset, charge view shows loaded furnace car inside furnace.

New *Sunbeam* furnace helps Kaiser meet expanding demand for Aluminum

Kaiser Aluminum & Chemical Corporation recently added this new Sunbeam heat processing furnace to help meet the growing demand for high quality Kaiser Aluminum.

Installed at Kaiser Aluminum's Chalmette Works, La., the furnace is divided into three zones of control. It homogenizes aluminum billet quickly and uniformly.

Among the furnace equipment's unusual features is a special transfer car system which brings the billet to and from the furnace car for easy loading and unloading operations. Other equipment built and supplied by Sunbeam includes a pre-wired control panel and a power panel.

What about your expansion plans? Kaiser Aluminum's new homogenizing furnace is an example of Sunbeam's leadership in building furnaces to supply a company's expansion needs. Why not let us help you meet the expanding demand for your aluminum products. Write or phone Sunbeam Equipment Corporation, 196 Mercer Street, Meadville, Pennsylvania.

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Precision Die Casting Magnesium Connectors for the Supersonic B-58

Magnesium turned out to be the best material, and die casting the ideal production process, when Cannon Electric designed a new type of electrical connector for America's first supersonic bomber. Here's how several design and production problems were licked.

by Martin H. Hankinson, Cannon Electric Co., Los Angeles

PRECISION die casting in magnesium, plus painstaking attention to design engineering detail, have produced a new breed of electrical connectors uniquely suited to the severe service conditions encountered in America's first supersonic bomber—the remarkable B-58 Hustler.

A full 26% lighter than comparable aluminum models, the Cannon DPSM is the first environmental connector with an all-magnesium shell. How this plug was designed to meet the needs of Convair's B-58 is an instructive example of engineering development in action.

7-Point Problem

The problem that General Dynamics' Convair Division at Fort Worth presented to Cannon Electric was this: To develop a sealed rack-and-panel connector, fully environmental, that would allow the airplane's equipment to be designed on a modular basis and keep weight and connector varieties to a minimum. The rack-and-panel plug was also to be used as a cable connector. Specific requirements were:

1. Extremely light weight.
2. Resistant to B-58 environment -- vibration, high altitude, operating temperatures of −65°F to +300°F, high humidity, salt spray, fungus, etc.
3. Rack and panel design with 1/16-inch horizontal and vertical float mounting and a total axial tolerance of ⅛-inch while maintaining a seal.
4. Adaptable for cable connector use.
5. All electrical junctures to be sealed to avoid voltage derating at altitude.
6. Low engaging and separation forces.
7. Removable crimp type contacts.

To meet these needs, Cannon Electric engineers set out to develop a unique connector. It was necessary to simulate the B-58 environment, then carry out the gradual evolution of a connector adapted to it. This evolution produced the DPS Series, culminating in the magnesium DPSM.

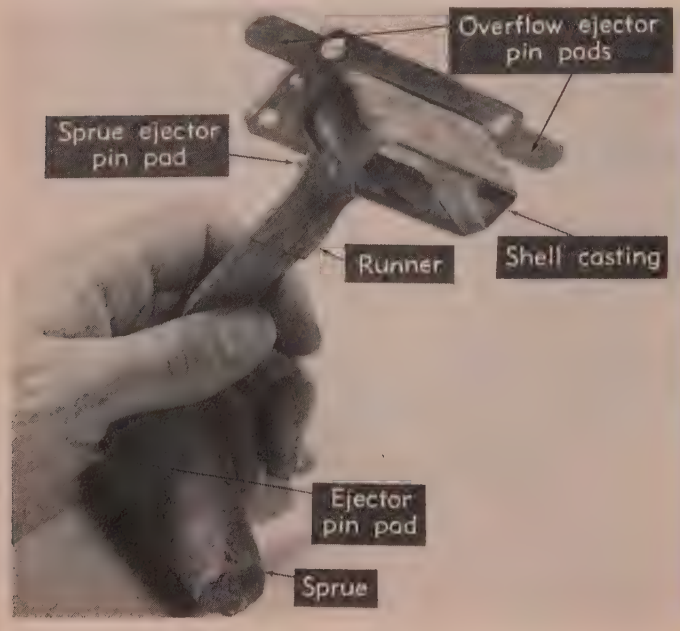
The weight reduction problem was solved in two ways: By using magnesium instead of aluminum as a shell material: and by removing every bit of unnecessary mass. This meant reducing corner areas, eliminating metal "bridges," and cutting the thickness of all sections. The result is a "sculptured shell."

A contract to develop and manufacture the magnesium shell to Convair's specifications and Cannon's requirements was awarded to the Dow Metal Products Co., division of The Dow Chemical Co., Midland, Mich. Because of the size and quantity of the connectors required, die casting was selected as the best method for producing the shell.

Tight Tolerances

Manufactured in four different sizes, the DPSM did not present any difficult casting problems. The real challenge was in the exceptionally smooth surface finish and close dimensional tolerances required for these parts.

Mating surfaces of the four castings for each connector must be smooth —free of drag marks, sanding marks, and



■ *Raw casting as removed from die casting machine (left) demonstrates the "outboard" ejection technique. Ejector pins in the die do not touch cast part itself, thus protecting its surface finish. The DPSMC magnesium plug above shows the "sculptured" shell and black anodic finish. Use of magnesium saves considerable weight.*

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mold parting-line flash. The surface finish requirement is 16 micro-inches or better, compared with about 125 micro-inches in normal die casting practice.

'Outboard Ejection'

These requirements demand exceedingly careful die making, casting and inspection procedures. To protect the surface finish of the castings, for example, Dow uses the "outboard ejection" technique of removing castings from the die. Ejector pin pads are located on either side of the casting, rather than on the casting (see photo). Since the ejector pins push against these pads rather than against the casting, no pin marks appear on the casting itself.

Because of its geometry, the male half of the connector cannot be ejected by ejector pins alone. Ejection is aided by use of a three-part die, the third part of which separates the casting from the die core. Then the other two parts open and ejection is completed by ejector pins.

Wall thickness at the engaging lip is 0.050 to 0.060-inch—unusually thin, considering the surface finish requirements. The finish of each connector is inspected under 4X magnification.

Several dimensional tolerances for the castings are as low as ±0.002-inch, compared to a normal close tolerance of ±0.005-inch. Internal draft (to permit withdrawal of the core) is held to an exceptionally low 0.007-inch per inch per side.

After passing stringent quality control standards, connector castings are furnished to Cannon with an oil finish upon which a black anodic finish is applied.

Another difficult problem was to achieve a pressure seal while also permitting a ⅛-inch axial tolerance and minimizing required insertion and separation force. The method adopted combined a step-down shell design with a sliding seal consisting of a thin wedge of "Silican 63," lubricated for ease of separation.

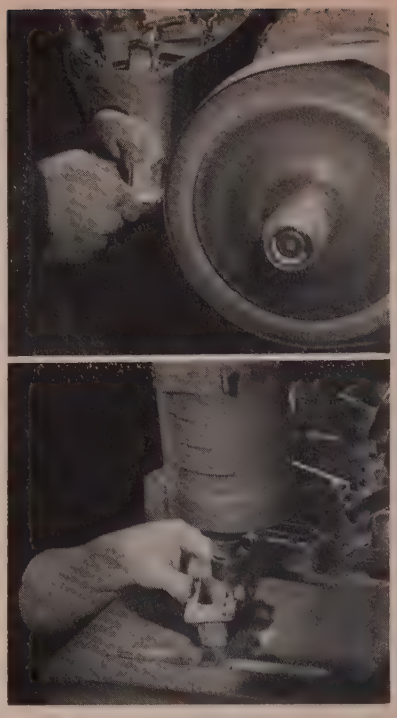
To seal off the wires at the rear of the plug, the end bell is tightened down on a resilient rear insulator. A hard diallyl phthalate material is used in the front portion to maintain pin alignment.

The problem of high and low operating temperatures was solved by eliminating solder and using heat-resisting silicones and plastics and a high-temperature finish. Removable contacts permit crimping of wires to contact; brazed or silver-soldered contacts are retained for thermocouple applications.

Now fully developed, the DPSM connector has proved the value of these new design concepts, has been pronounced completely successful in the B-58, and is now available to the aircraft and missile industry in general.

The four basic sizes come in about 15 different insert arrangements. It can be furnished with coaxial and thermocouple contacts and airline fittings, in addition to standard No. 10, No. 12, and No. 16 contacts.

Since each of the four basic shells can be adapted to a variety of uses by simply employing different inserts, a relatively small number of spare parts can be utilized in many ways. In addition, only those contacts which actually perform a circuit function are inserted in the insulator. Holes in which contacts are not inserted are filled with lightweight plastic fillers, thus eliminating the extra weight of unused contacts. The hole fillers also maintain the pressure-tight integrity of the insulator.



■ ***Flash is removed from edges of raw castings by abrasive belts (top). Power drill (bottom) removes mold parting line flash from holes of castings.***

Castings Anodized Black

The magnesium shell is protected from corrosion by a black anodic finish, durable enough to more than fulfill the salt spray test requirements of Military Spec QQ-M-151. The connector is tested for thermal shock with temperature cycling between −65°F and +350°F for 2½ hours and then up to 392°F for ½ hour. Ten cycles are performed with the connector held at the temperature limit for three hours in each half-cycle.

The "napkin wrap-around" type contact springs are of heat-hardened beryllium copper, and socket contacts are of machined closed-entry construction.

Although intended mainly for rack-panel installations, the DPSM can also be used as a cable connector. Accessory adaptors are furnished to provide positive connection security in the cable application. Other accessories include crimping tool, contact installation and removal tools, dust caps, and pressure covers.

■ ***Surface finish of each magnesium casting is inspected under 4X magnification. This maintains rigid quality control standards for smooth surface requirements.***

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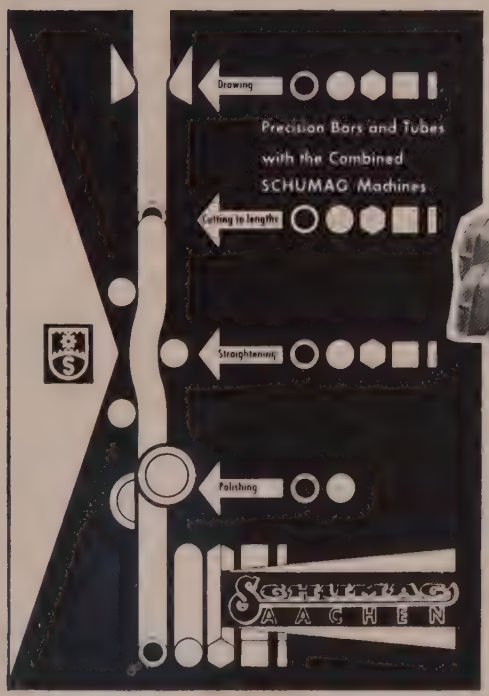

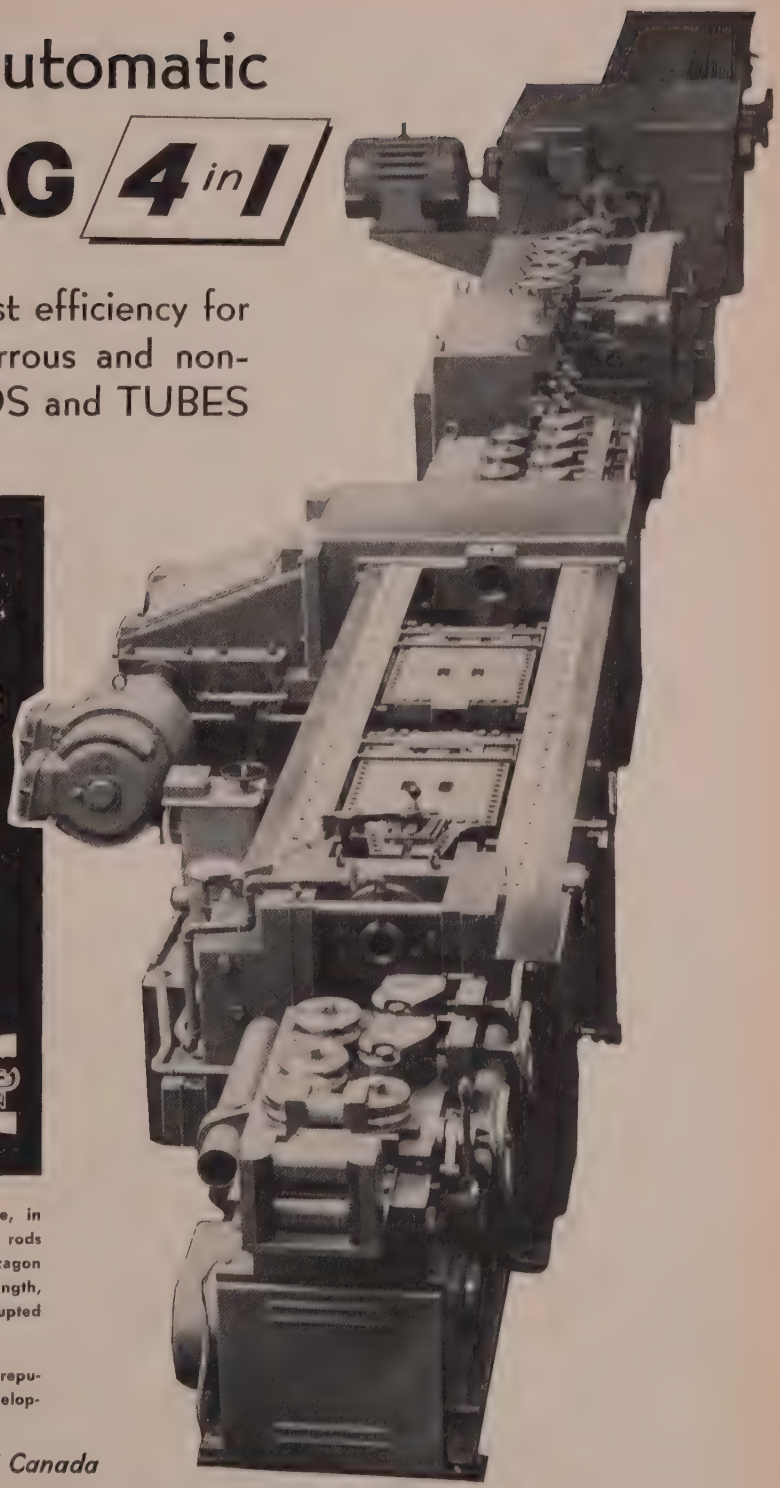

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New Filter for Rolling Mills . . .

- enhances product quality
- speeds production
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- prolongs roll life
- improves working conditions
- slashes filter costs
- saves coolant oil

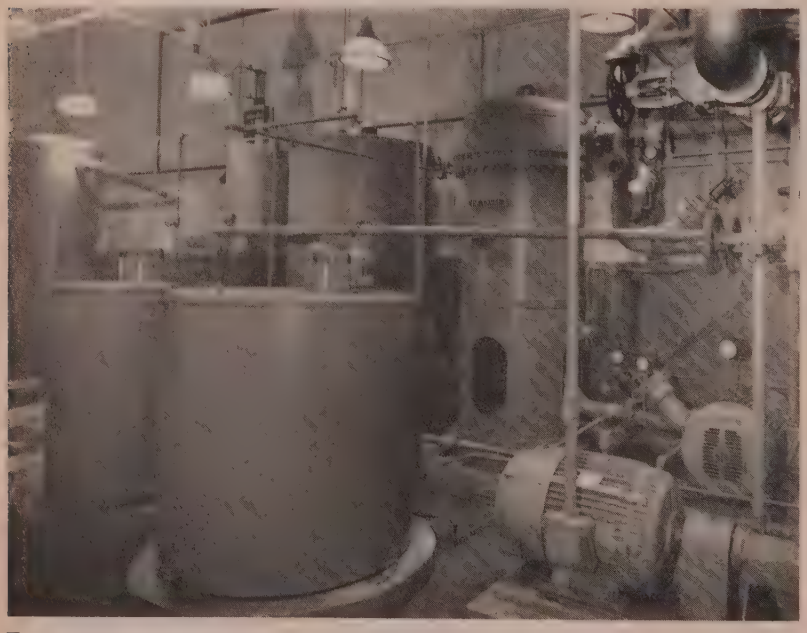
by J. R. Schneider, Filter Specialist, De Laval Turbine Pacific Co., Millbrae, Calif.

A NEW industrial filter that saves enough in operating and maintenance costs in aluminum rolling operations to pay for itself in less than two years has been developed by the De Laval Turbine Pacific Co., Millbrae, Calif. Designated as an automatic, full flow diatomaceous earth filter, it also maintains mill coolant better than the generally used method.

Developed especially for the rolling mill industry, the first of these filters was installed three years ago in Kaiser Aluminum's foil mill at Permanente, Calif. It represented the combined engineering efforts of De Laval personnel and Kaiser Aluminum's Hugh Beekes, plant engineer, and Marvin McDole, design engineer.

Filters Full Mill Flow

It replaced a bank of three press filters which were capable of filtering only 25% of the mill flow on a by-pass system. Operating from a 5000 gallon reservoir, the De Laval unit in the oil cellar at the mill filters 100% of the mill flow which varies from 100 to 600 gallons per minute.



■ *The De Laval automatic filter installation in the Archer aluminum foil mill of R. J. Reynolds Tobacco Co. This view shows, in the foreground, the precoat tank (left), the body feed tank and the mill pump. In background (left and above body feed tank) is the recovery filter, drain tank, filter, valves, gauges and filter pump. System paid for itself in less than six months in cost savings in filter operation alone. Other advantages: Helped enhance quality of aluminum foil rolled; boosted production efficiency; improved working conditions.*

As the coolant passes through the mill it picks up metallic oxides and other foreign material. Under the old system only a portion of these contaminants was removed. With the full flow De Laval filter, contaminants are practically eliminated.

The dirty oil that passed through the former system created other problems. Equipment was constantly dirty; grime picked up from it and the material being rolled was a constant annoyance to workmen. Also, the coating of dirty oil on the aluminum created staining problems during intermediate anneals.

Contaminants in the coolant also contributed to the creation of pinholes in the aluminum foil.

The ease of operation of the De Laval filter eliminated the time required to break down, clean and reassemble the by-pass filters it replaced.

Here's How It Works

The De Laval filter has been installed in many operations where high clarity is desired in the oil system. It employs the precoat principle. Filter tubes with openings of .005-inch are precoated with diatomaceous earth. This material is capable of filtering out contaminants as small as one-half micron in size.

After the diatomaceous earth has automatically precoated the filter tubes, the system oil is permitted to pass through the filter and back to the reservoir. With the automatic diatomaceous-Fullers earth type of filter, it is possible and preferable to filter the oil faster than it is supplied to the mill. The oil reservoir is divided into two sections separated by an overflow baffle. The oil from the mill flows into the prefiltered section, then to the diatomaceous earth filter, then back to the

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clean oil section of the reservoir.

Because the oil is being filtered at a greater rate than it is being supplied to the mill, coolant continually cascades from the filtered section of the reservoir over the baffle into the prefiltered area.

During the filtering operation on mineral oil systems, Fullers earth mixed with diatomaceous earth is fed from a body tank to the filter so that both color and ash can be controlled. At the end of each filter run (determined by a pressure drop across the filter cake) or during a shutdown of the mill, the filter cake and oil are blown down into a drain tank.

Down Time: 15 Minutes

The clean filter is then ready to go back into service immediately. Shutdown time for this cycle is a maximum of 15 minutes.

A recovery unit picks up all of the blowdown oil and delivers it back to the filter system in a clean condition. The sludge is removed from the recovery filter after it has been air blown into a powdered form.

The entire operation is automatic. All the operator does is fill the precoat and body feed tanks and empty the recovery filter. The manual attention required in a normal filtering day is 15 minutes.

By providing a constant supply of bright clean coolant, free of oxides and carbon contaminants, the filter offers the following advantages to aluminum rolling mills.

1. Improves sheet and foil quality by reducing staining, increasing brightness, and reducing the number of pinholes.
2. Increases mill output by reducing slippage in the rolling of sheet aluminum and the stickiness encountered in rolling foil. Clean coolant also reduces the number of breaks when light gauges are being rolled.
3. Increases roll life by reducing roll graying caused by oxide in the coolant.
4. Improves working conditions by eliminating the contact workmen have with dirty equipment, stock and surroundings.
5. Reduces mill operating costs by prolonging the life of the oil and reducing maintenance cost.
6. Reduces filter operating cost by eliminating manual cleaning.

At Reynolds Tobacco . . .

Several aluminum rolling mills are exploiting these advantages of the De Laval filter. In Winston Salem, N.C., for example, the Archer Aluminum Division of R. J. Reynolds Tobacco Co., found that the filter paid for itself in less than six months with cost savings in filter operation alone. It also helped enhance the quality of the aluminum foil rolled at the mill, boosted production efficiency, and improved working conditions.

Monthly Saving: $1800

The plant's existing filtration unit, based on a Fuller's earth and pleated paper by-pass system, was costing more than $2000 a month per mill to maintain the low level of ash content required.

A 500-gpm De Laval filter was installed and reduced this cost to $200 a month, a monthly savings of more than $1800. The company soon installed three more De Laval units in its mill.

A De Laval filter was also installed in conjunction with a modernization program at the Nichols Wire and Aluminum Co. plant at Davenport, Iowa.

"To the best of my knowledge, it performs better and more economically for our application than any filter on the market," reported Jim Morris, Nichols' general manager. "Without clean oil we couldn't have made certain changes on our mill that provided definite economic benefits in our rolling operation."

At the Lando Products plant in Sausalito, Calif., two rolling mills are supplied by a De Laval unit with a 225-gpm capacity. These mills are used in the rolling of aluminum strip for the venetian blind industry and for aluminum product manufacturers.

Until the De Laval filter was installed last October, Lando Products employed separater oil sumps and cooling systems supplying each mill. Today, a 3000 gallon reservoir and a single circulating system supply both mills.

Won't Waste Any Oil

"We would use the oil for three to six months in each mill until it got so dirty we had to throw it away," commented Karl A. Klenz, Lando's chief engineer. "Now, we will throw no oil away. More important are the other benefits the filter has brought to our operation, such as the consistency it gives to the condition of the aluminum strip as it moves from the rolling mills into the baked enamel line."

According to Klenz, the uniform strip condition achieved with a constant quality of clean oil enabled the company to set up a fixed standard for the concentration of cleaning solution used to remove dirt and oil adhering to the aluminum. Previously, the varying conditions created by dirty oil presented a constant problem both in the enameling line and in the annealing ovens where it aggravated the staining problem.

Both of these problems have been greatly reduced, as has been the annoyance of dirty oil adhering to strip stock produced for other manufactures.

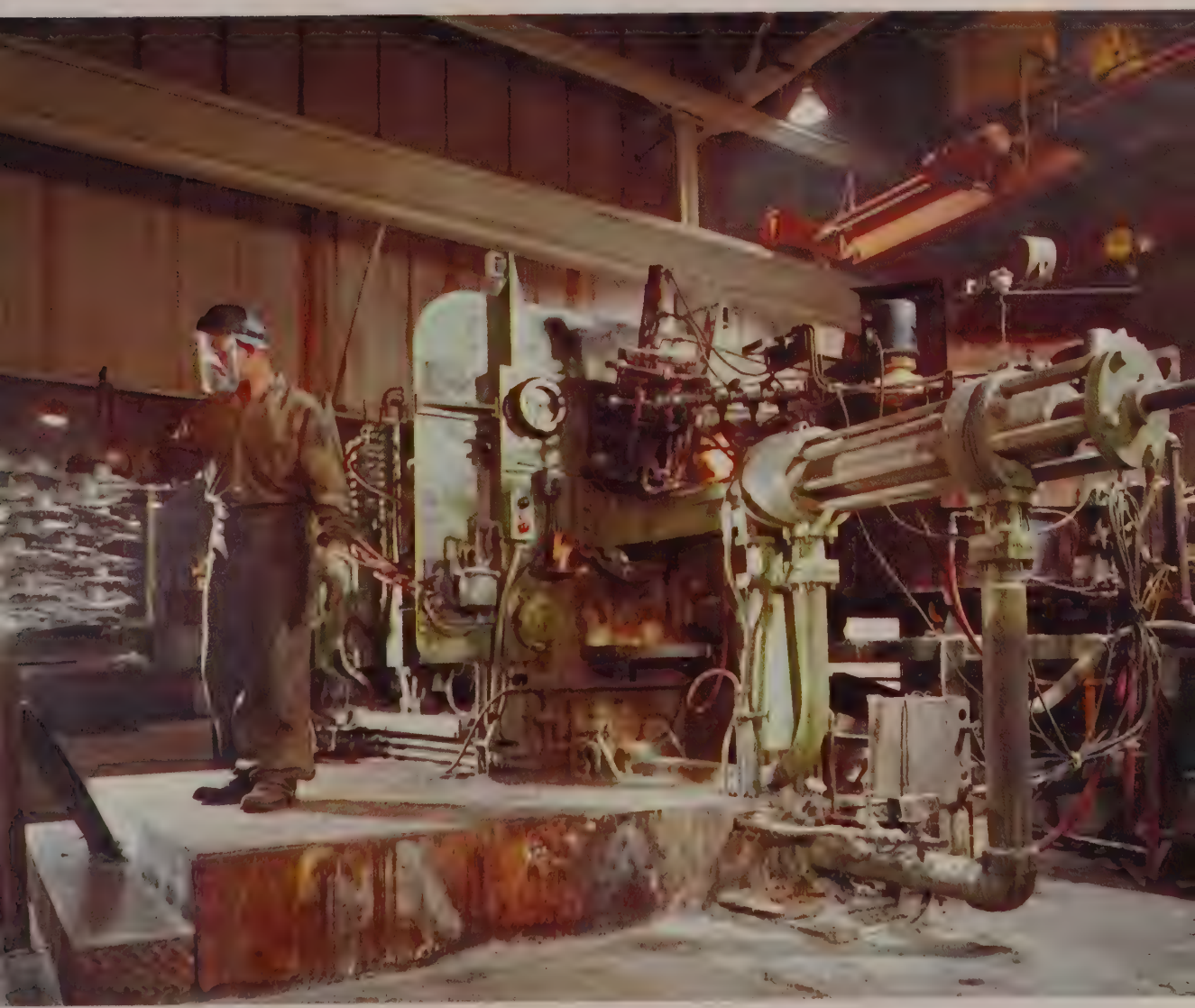
■ ***At Lando Products' rolling mill in Sausalito, Calif., sludge is removed from recovery filter after it has been air blown into powdered form. De Laval recovery unit picks up filter cake and oil at end of each run and delivers cleaned oil back to filter system. Substantial savings in oil are realized.***

This is The Dow Metal Products Company

NEW DIE CASTING PLANT

Economy in production marks Dow's new plant at Bay City, Michigan, thanks to efficient plant layout and advanced die casting technology and equipment. For example, a Dow-developed device automatically meters magnesium to machines. Result—increased production rate. And one of the country's largest casting machines is at work here.

Among this plant's invaluable advantages are highly trained men with rich experience in all sizes and types of die castings, backed by a fully qualified and well equipped quality control department.



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35 years' experience in complex sand and permanent mold castings . . . machine tools for cleanup . . . the most modern techniques. All this, and more, at Dow's Bay City foundry. You'll gain, too, from experience which spans the field from pattern engineering to modern inspection methods . . . X-ray, fluorescent penetrant, and direct reading spectrometer.

Thin wall castings, tubeless passageway castings, and enclosed shapes are but a few examples of this foundry's capabilities.

DOW **THE DOW METAL PRODUCTS COMPANY**

Division of The Dow Chemical Company

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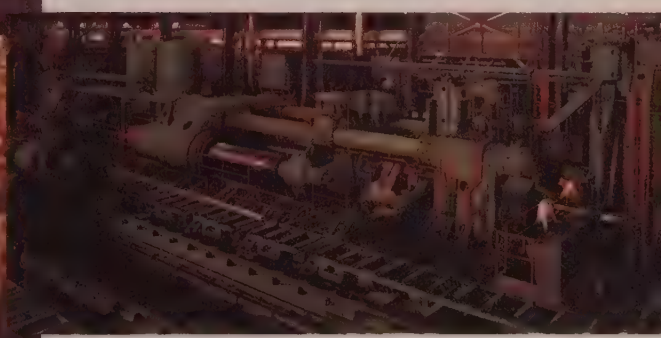
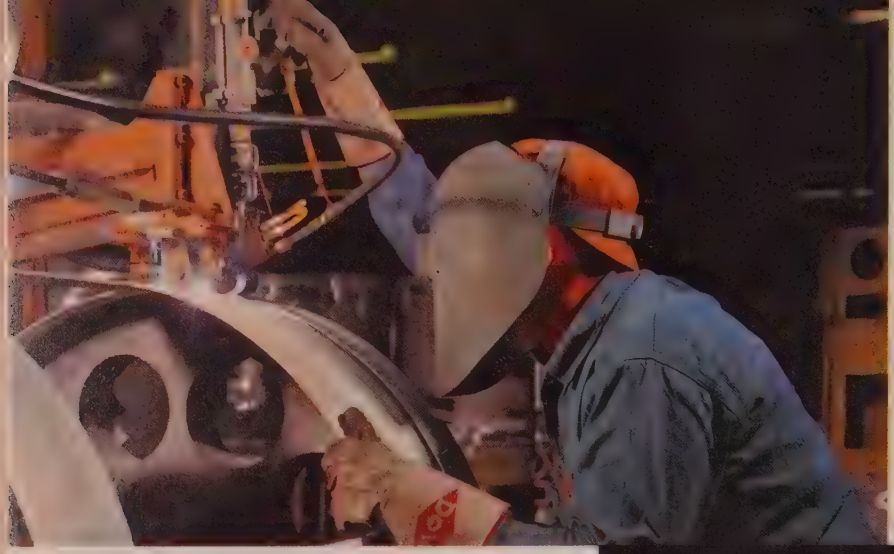
Complete tool and die shops, heat-treating, chemical treating and painting facilities are also utilized to provide high quality products. Rigid quality control and inspection standards are maintained through the use of such up-to-date equipment as an ultrasonic immersion testing unit.



DOW | *Now in*

magnesium and aluminum



For more information, contact the Dow sales office near you or write to THE DOW METAL PRODUCTS COMPANY, Midland, Michigan, Merchandising Dept. 1041 LE5-9.

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COMPLETE FABRICATION PLANT

Dow's Bay City fabrication plant offers complete production facilities for magnesium, aluminum, and magnesium-aluminum assemblies.

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Extruded, Anodized Marine Hardware Brightens Recreational Fleet

MANY week-end mariners in the past several years have purchased aluminum boats to add to our nation's recreational fleet. Now, aluminum accessories are being produced which enhance the fleet's appearance and make part-time sailoring easier.

Extruded and anodized marine hardware is being produced by Evans Marine Equipment Co., Chicago, and marketed under the trade name Emarco. According to the firm, Emarco marine hardware went into production only after a four-point product quality program was developed.

Evans claims the following for its new line: "Bold new styling going beyond traditional designs; extra strength at points of maximum stress because solid extrusions are used; elimination of tedious polishing because the bright anodized fittings do not require the maintenance conventional plated fittings need to prevent tarnishing and pitting; design meets Coast Guard specifications and provides safety and dependability."

Solid extrusions for the Emarco line are produced by Precision Extrusions Inc., Bensenville, Ill. Precision says that the fittings produced from solid extrusions offer advantages to sailors because the extrusions "provide strength and sturdiness, and can be anodized for protection against elements."

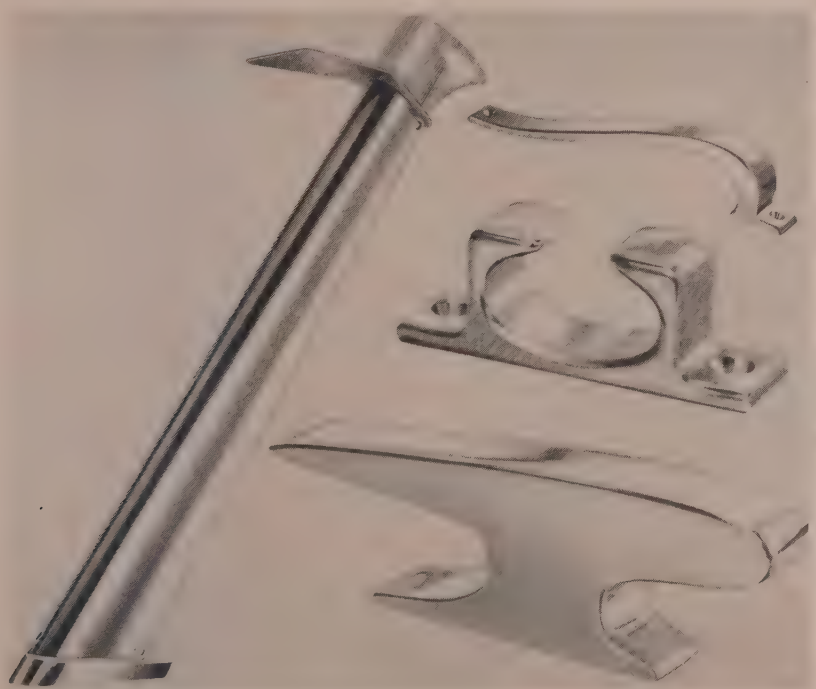
One of the products in the Emarco line is an ensign staff which comes in 22 and 33 inch lengths. This unit consists of two extrusions — the staff and its base. The staff is extruded with a small channel running its length so wires can be pulled through to power the end light.

This item is made by cutting sections from random-length extrusions, then tapering the sections by swaging and piercing to provide halyard holes. This design differs from conventional staffs which are made from steel tubes.

Other items in the line include mooring cleats, bow or hatch handles, fairleads and stern chocks. These, too, are sawed to size by Evans from random-length extrusions; then mounting holes are drilled and tapped to the base. Polishing, buffing, and anodizing—in either a natural or gold finish — follow.

All parts are extruded through shear-face dies, with the exception of the ensign staff. This part requires a bridge-type die because of its channel. Alloys 6063 and 6463 are used.

Evans says its major customers are owners of open and closed cruisers and runabouts.



■ *Emarco marine hardware. At left, ensign staff with plastic light at top and adjustable reflector. At right, top to bottom, bow handle, bow chock, mooring cleat.*

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Welding Aluminum

Part 7: Torch, Furnace and Dip Brazing

The many intricacies of torch, furnace and dip brazing aluminum are detailed in this article. Remaining segments in this series will cover pre- and post-welding operations, supervision and safety, quality control, and mechanical properties of aluminum welds.

Based on information supplied by Aluminium Laboratories Limited, Research Division of Aluminium Limited

IN aluminum brazing coalescence is obtained by heating the parent metal to a temperature just below its melting point and adding an aluminum filler alloy. An active flux is used to promote "wetting of" joint surfaces by the filler alloy, which has a melting point only slightly below that of the parent metal.

Although the parent metal is not melted, there is definite diffusion of it and filler alloys. Thus, the metallurgical structure of a brazed aluminum joint consists of a continuous alloy system similar to that obtained by welding. The filler alloy is distributed uniformly between the surfaces of the joint by capillary action.

Material from 0.006 inch to approximately 1/8-inch thick, as well as combinations of the two, can be brazed. This process is also an economical and simple means of joining extremely thin material and assemblies that have relatively inaccessible joints. Mitred joints in structural shapes and mouldings less than 1/8-inch thick, such as window and picture frames, can be brazed easily.

Brazed Joints Look Good

Brazed aluminum assemblies present a good appearance, with smooth fillets that require little or no finishing. The flow of the filler in the joint area may be controlled to minimize the arch of darker fillet metal.

The strength of a brazed joint is comparable to that of a welded joint. The flux used in brazing aluminum is very active and must be removed completely after brazing since any residues could be a source of corrosion.

Three processes for brazing aluminum and its alloys are used: Torch brazing, furnace brazing, dip brazing (see Table 1). Torch brazing is used widely because the equipment is inexpensive and readily available and the technique is easily acquired. Furnace and dip brazing require more elaborate equipment and fixtures and, therefore, are used mainly for quantity production.

Aluminum alloys 1100, 3003, 5052, 6061, 6063, and 6063 clad on one or both sides can be brazed. (Note that the brazing process is primarily for use with wrought alloys.)

The non-heat-treatable alloys are suitable for most assemblies that are not highly stressed. Alloy 5052 may be torch brazed only after careful preparation and heating of parts, because the alloy has a thick surface oxide coating and poor wetting characteristics during brazing. Brazing of the non-heat-treatable alloys results in complete annealing, so consider this in design.

The heat-treatable alloys, 6061 and 6063, are used in high strength applications. Since the melting temperature of 6061 is close to the melting point of the filler alloy, the brazing temperature is critical and must be precisely controlled.

These alloys also become annealed during brazing, but quenching from the brazing temperature (above 930°F) produces a reheat treatment which increases the properties above those obtained in the annealed temper. Braze in the T-4 temper if parts must be formed or drawn.

All the wrought alloys referred to can be anodized. However, the filler material of a brazed and anodized assembly will be darker than the parent metal. In a neatly finished job, designed for line joints and where the flow of filler has been controlled carefully, the thin line of brazing filler will show only slightly.

The aluminum-copper alloys such as 2017 and 2014 are not brazed because of metallurgical factors. The zinc-containing alloys—7075—cannot be brazed.

Castings are not as readily brazed as the wrought alloys. Generally, they have melting temperatures slightly above those of the brazing filler materials and consequently a very precise technique is necessary for brazing them.

There are four alloys commonly used as brazing filler material. They include: BA1Si-1 — brazing range 1050-1185°F; BA1Si-2 — brazing range 1120-1140°F; BA1Si-3 — brazing range 1060-1185°F; BA1Si-4 — brazing range 1090 to 1185°F.

Filler materials BA1Si-1 and BA1Si-3 are best for furnace or dip brazing. BA1Si-2 is also best suited for these two methods, but is available only as a coating on 3003 or 6951 brazing sheet. BA1Si-4 is used for torch brazing and is the only filler material available as a powder.

When selecting the filler metal and flux for a brazing operation consult a welding distributor to be sure of getting proper materials.

Keep Flux Dry

Some flux comes as a powder in airtight containers and keeps indefinitely if the containers remain hermetically sealed. Reseal the container carefully each time flux is removed to prevent contamination by moisture, metal, dirt, etc. For most applications, buy flux in small containers because it is almost impossible to keep large ones dry.

Flux may be applied to the work and filler material by brushing, dipping or spraying, using the flux consistencies given in Table 2.

Brushing and dipping are generally

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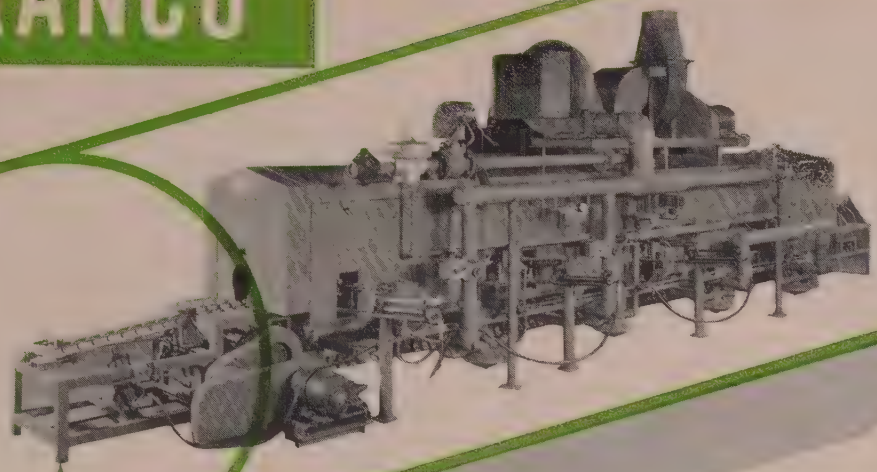

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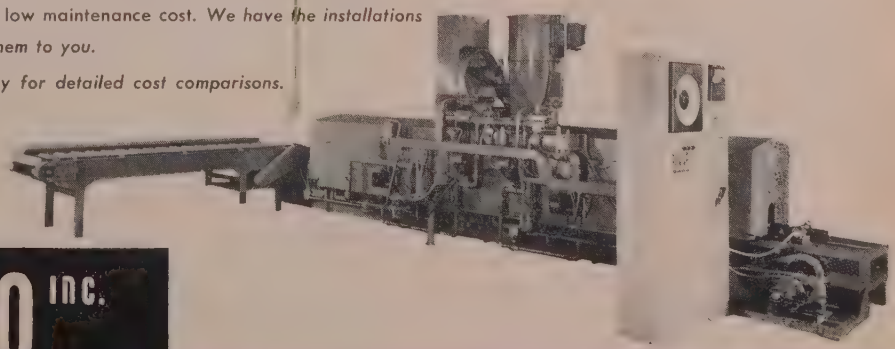

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used when torch brazing, while spraying is confined mainly to mass production procedures with furnace brazing. Braze within 45 minutes after flux application.

Joints used in brazing aluminum generally have line contact between the parts to be joined to produce the most desirable and effective fused connection (see Fig. 1). Line contact is needed for the capillary flow of filler metal, which sweeps out dross and flux and forms reinforcing fillets on both sides as it runs between parts. Clearances are determined by trial but ordinarily should not exceed 0.020 inch.

To Braze Flanged Joints . . .

Flanged joints can also be brazed. Excellent joints result when there is a small angle (5° to 8°) between the flanges. Then the flux is more readily flushed out by the flow of the molten filler. The Tee joint with or without flange is another commonly brazed joint.

Do not use plain butt joints if high strength is required. Undercutting is prevalent, and filler metal does not build up readily outside the faying area. A lap joint is strong enough but it is difficult to produce sound joints without inclusions if the overlap is greater than ¼ inch or three times the thickness of the thinner sheet in the joint. Angular lap is preferable to parallel.

Self-jigging assemblies are recommended whenever possible. When self-jigging is not feasible, an assembly can be held in place with rivets, spot or tack welds or by using unit assembly (strips of light-gauge material which after brazing become integral to the assembly).

Where brazing sheet is used, rivets on the clad side will be brazed automatically around their heads. Otherwise locate them so preplaced filler will flow to form a similar reinforcement.

Unit assemblies are advantageous, especially in dip brazing. The most desirable assembly is one that when assembled can be handled while the filler material is cooling and solidifying.

Jigs and other temporary holding devices are usually necessary but should be kept to a minimum for reasons of economy. They should be small, light and clean, and of non-contaminating materials.

High-melting point aluminum alloys are the best material for jigs, although aluminum-coated steel, nickel, mild steel and wrought iron may also be used. Point or line contact between the jig and work is essential to uniform and rapid heating. Heating costs can be minimized if jigs are removed from work prior to quenching.

Pressed fits are not usually used because of the danger of entrapping flux and cleaning solutions. However, they may be used to position pieces, if fillets can be formed at the ends of the press-fitted sections. Slip fits with a clearance of 0.005 to 0.10 inch are preferred.

Rough-sawn edges or an edge with shallow (approximately 0.010 inch deep) indentations are used frequently for Tee joints. The small indentations provide a loose fit permitting flow of the filler material, while the remaining parts of the edge serve to stabilize the sheet. But be sure that burred edges and fragments of metal are removed, to prevent oxidized inclusions and irregularities.

Friction is employed frequently for holding parts such as fins or flanges in position during brazing. If fins or flanges are used they should fit tightly on the parts so they will not slip during brazing. Special extruded shapes often cut fabricating costs as such parts can be made to interlock to support each other.

When brazing large complicated assemblies into a single unit it is sometimes convenient to use sub-assemblies. They can be held in place with conventional methods, but must be designed so flux and filler can flow into the joint and still permit easy flux removal and finishing.

Brazing is not as severe an operation as welding but expect some degree of distortion, especially if parts are large, of thin-gauge material or if heating is not uniform. Uniform heating depends mostly on operator skill in torch brazing, heating method, and type of work.

Little Distortion

Furnace brazing causes practically no distortion because heating is uniform. Sagging, when hot, can be prevented by careful design and support. Distortion due to quenching, if necessary, can be lessened by using a spray or air blast.

Normally, residual stresses in brazed joints are insignificant. When a hollow member is to be completely sealed, the tendency to distort, collapse, or disturb the molten filler during brazing can be prevented by drilling, near a joint, a small relief vent which is later closed by torch brazing.

(*Continued on page 66*)

TABLE 1: Steps in the Three Brazing Processes

Torch Brazing	Furnace Brazing	Dip Brazing
Preparation of materials (Cutting, Bending, Drawing, and other forming)	Preparation of materials (Cutting, Bending, Drawing and other forming)	Preparation of materials (Cutting, Bending, Drawing, and other forming)
Preparation of torch equipment	Preparation of equipment (Furnace at proper temperature: cleaning solutions ready)	Preparation of equipment (Furnace and flux bath at proper temperature cleaning solutions ready)
Degreasing or cleaning of all material	Degreasing or cleaning of all materials	Degreasing or cleaning of all materials
Chemical etch cleaning (if necessary) or wire brushing	Chemical etch cleaning	Chemical etch cleaning
Flux preparation and application	Flux preparation and application	
Assembly① (Jigging, if necessary)	Assembly① (Light jigging if necessary)	Assembly (Preferably self-jigging or jigging kept to a minimum)
		Preheating in furnace
Brazing with torch	Brazing in furnace	Brazing in flux bath
Cooling or quenching	Cooling or quenching	Cooling or quenching
Hot water washing	Hot water washing	Hot water washing
Chemical flux removal	Chemical flux removal	Chemical flux removal
Finishing and inspection	Finishing and inspection	Finishing and inspection

NOTE: ① Assembly may conveniently precede fluxing or chemical cleaning, if the nature of the work permits.

ART GEORGE has a good word to say for Lindberg Melting Furnace performance

QUOTE

Mr. Art George, Senior Production Engineer, Golden Valley Plant, Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

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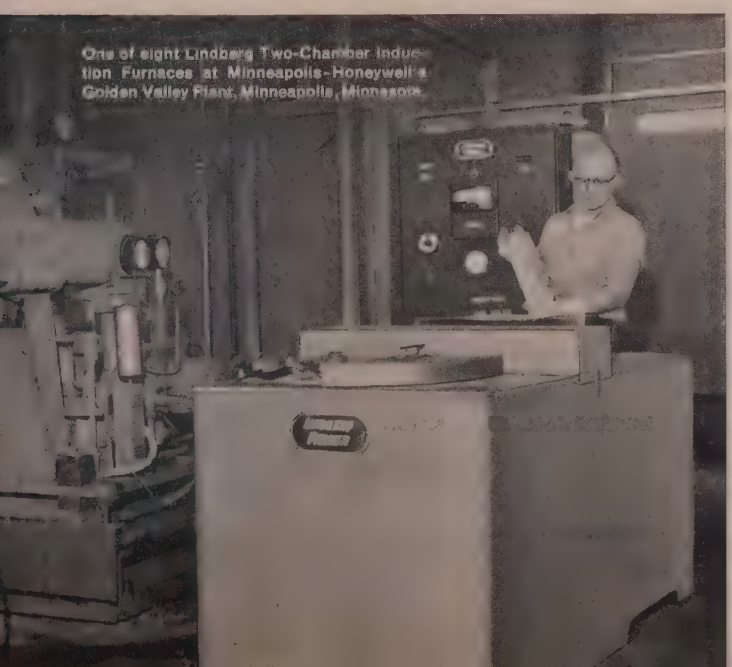
**Altogether, 44 Lindberg Furnaces are in operation in various Honeywell plants.*



One of eight Lindberg Two-Chamber Induction Furnaces at Minneapolis-Honeywell's Golden Valley Plant, Minneapolis, Minnesota

These eight Lindberg-Fisher Induction Furnaces melt and hold aluminum and zinc for die casting gas valve housings and other component parts. They are located at the die casting machines where ingot and scrap can be melted and held at the desired casting temperature in one convenient unit. Magnetic fluxing and stirring insures uniform temperatures and consistently clean metal.

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Parts to be brazed and the filler material must be thoroughly cleaned to obtain satisfactory brazed joints. Alloys 1100 and 3003 for torch, furnace or dip brazing may require only degreasing by mechanical or chemical means. If these alloys are reasonably clean, just wipe with a rag for torch brazing.

All other alloys and brazing sheet require a chemical etch after degreasing. This is also necessary when brazing cast parts. Thorough rinsing in clean water is a must to be sure all etching chemicals are removed.

Clean Filler Metal

Filler material should also be etch cleaned after it has been formed or shaped to the correct size, and before it is fluxed. It is also imperative that all other materials and equipment used — flux mixtures, flux applicators, tables, benches, etc. — be perfectly clean.

To cool after brazing quench the assembly in boiling water. Assemblies of very thin material, or others which cannot be immersion quenched, can be cooled with a water spray or air blast. Quenching should be as uniform and rapid as possible to minimize residual stresses. There is no danger of cracking brazed aluminum by quenching.

Quenching assemblies made of the heat-treated alloys in hot water produces a heat treatment. The effectiveness of this treatment is governed by the nature of the assembly and the temperature from which the various parts are quenched. If maximum mechanical properties are required in the parent material the assembly should be reheat-treated.

Since brazing flux is a potential source of corrosion, it must be removed. This may be done by quenching, washing and vigorous scrubbing in boiling water.

Mechanical finishing of brazed joints is not usually necessary. When appearance is important, however, chemical brightening, wire brushing or polishing, especially if the unit is to be anodized, or other finishing methods can be used.

There should be no need for grinding or chipping. The excellent appearance of the product without such finishing is one of the many advantages that brazing has over other methods of fusion joining.

Torch Brazing

Torch brazing is a simple process best suited to the joining of assemblies in which all parts are reasonably accessible to the flame so they can be uniformly heated. The technique is acquired readily and an operator who can use an oxyacetylene torch can make satisfactory brazed joints after a half day of instruction.

Costs are relatively low and a minimum of working area is required. Thus, in many applications the process is a satisfactory alternative to fusion welding, especially on metal up to 1/8-inch thick. Best results are usually obtained with relatively small parts or lengths of joints. However, it is feasible to torch braze thin to thick gauge material.

Torch brazing is not usually competitive with furnace or dip brazing for intricate assemblies or when mass production is involved.

TABLE 2:
Flux Mixtures

Method of Application	Parts by Volume of Flux	Distilled Water
Brushing	3	1 (containing 0.1% Tergitol Penetrant No. 4)
Dipping	3	2 (containing 0.1% Tergitol Penetrant No. 4)
Spraying	1	1 (containing 0.1% Tergitol Penetrant No. 4)

Equipment You Need

Torch brazing equipment is the same as that used for gas welding. The oxyacetylene flame is generally used but the oxyhydrogen flame will give good results. Other gases, while satisfactory, are slow and mainly used in preheating.

The size of torch tip is usually slightly larger than that required for gas welding (see Table 2, Gas Welding, Oct. p 68). The gas pressures used should be low (2 to 3 psi) so flame can be adjusted by torch controls. Use a soft slightly reducing flame. It prevents great concentrations of heat, and safeguards against oxidation. When using an oxyacetylene flame the white cone should be approximately twice the length of the inner cone.

When brazing, the torch is held and manipulated in a manner similar to that used in gas welding. It is passed back and forth over the work so the flame plays directly on the parts and heats them uniformly. If there are variations in thickness and size in the assembly concentrate heat on the large and/or thick parts; small areas require little, if any, preheating.

During heating, the water content of the flux is driven off, leaving a white deposit of dry flux. Its appearance is an excellent indication of the preheat temperature. The flux gradually melts, turns gray and becomes more fluid. At the proper brazing temperature it has the fluidity of water, and is completely transparent with a silvery sheen showing from the surface of the metal beneath the flux.

At this point, the flux-coated filler wire is introduced to the joint and the flame concentrated in the joint. It is held at an angle of 5 to 25° to the line of the joint and directed against the filler wire. Filler wire is held in the joint and fed with a straight-forward motion as the end is melted off.

On short joints, or joints in tubing and other symmetrical shapes, filler can be added from one point. For longer or more complicated joints it is necessary to add the filler material progressively along the joint.

During brazing it may be necessary to withdraw the filler wire frequently and reheat the joint. This makes the fillets smooth and uniform. It is only necessary to add filler material from one side of the joint as the capillary action will cause a fillet to form on both sides if they are properly heated.

At all times it is important that the flame is not brought too close to the work for it may blow either the dry or molten flux or disturb the natural symmetry of the fillets. Be careful not to overheat or melt local areas of the parent metal since brazing takes place at a temperature fairly close to the melting point of the parent metal.

Once the required joint has been formed, the assembly should be cooled until the filler material has solidified. In applications where appearance is important, use butt and mitre joints; keep flux off the exposed surface; add filler metal from underneath; keep fillets as small as possible.

Furnace Brazing

Mass production of aluminum products by furnace brazing is usually more economical than other joining methods. Another advantage of the process is that assemblies of widely-varying character can be treated with no changes in operation other than adjusting furnace time.

This process can handle complex assemblies that cannot be joined any other way. It is particularly valuable when joining a large number of small parts involving various joint lengths. Brazing furnaces have a uniform temperature throughout the working zone, and can be controlled within ±5°F of the furnace setting.

Filler material is determined mainly by the alloy or alloys being used. Generally, the best results are obtained when there is maximum difference between the melting points of the parent and filler alloys. Careful selection of the filler is a prerequisite to economical and efficient brazing.

Size and shape of filler pieces depend upon the design of the joint, convenience of the placing of the filler, flow considerations and the final function of the assembly. Common forms are washers, rings, clips and other shapes which fit the joint contour. Do not use too much filler material.

Brazing sheet is particularly suitable for furnace brazing as it supplies its own filler material. Also, it can be shaped by bending, drawing, hammering or any of the forming processes used for 6063.

Normally, flux is applied only to those parts of the assembly immediately in and around the joint where flow of filler is desired. However, flux is applied over the entire surface of brazing sheet. This assists the flow of the filler cladding to the joints and provides a smooth surface after brazing.

Stop-offs are used to direct filler material. They usually consist of a mixture of equal parts (by weight) of a medium-heavy engine oil (SAE 30), finely powdered graphite, and benzine or other mineral spirits. The mixture is brushed or sprayed and baked at 390° to 600°F.

Stop-offs are also used on jigs or racks to prevent their being brazed to the assemblies. A single treatment will be effective for several brazing cycles.

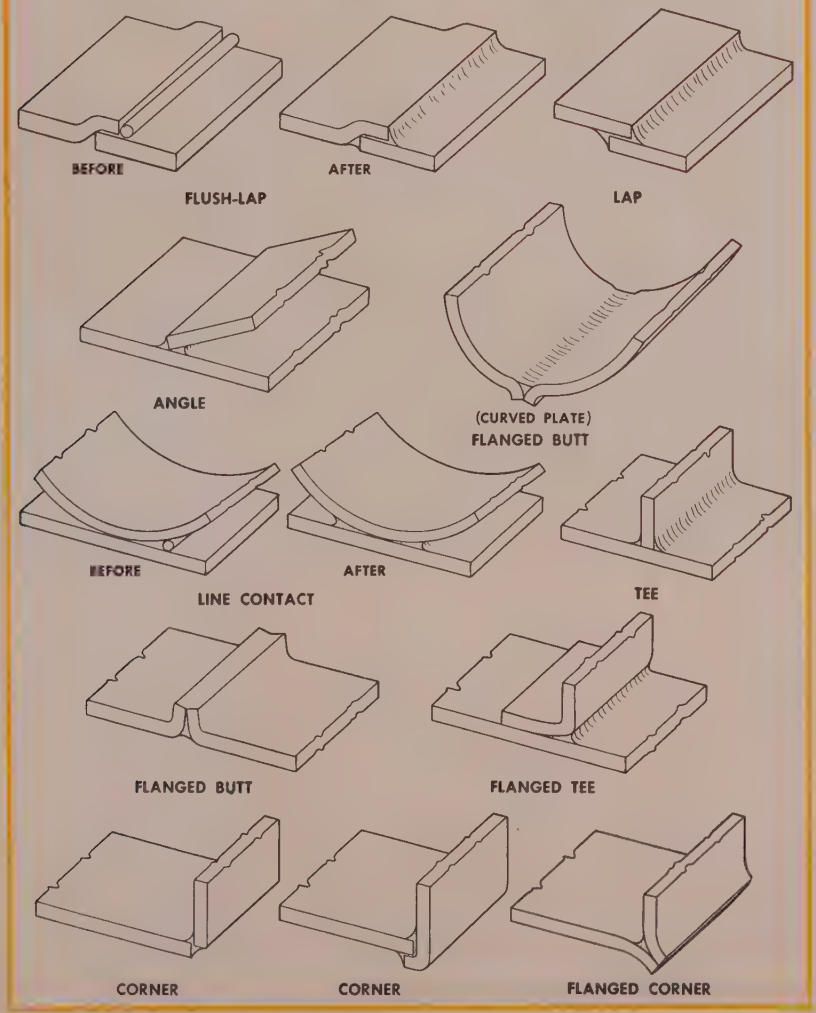
The types of joints, clearances, jigs and cleaning described for torch brazing apply to furnace brazing.

Use Standard Air Furnace

Standard forced circulation air furnaces (temperatures range 1000°F to 1200°F) can be used for aluminum brazing if they are equipped with accurate temperature control and are not contaminated. Ordinary heat-treating furnaces are frequently employed.

Both electrically-heated and gas-fired furnaces may be used since close temperature control is possible with both. Aluminum-coated steel is the best material for furnace linings and equipment. Plain uncoated steel is also satisfactory, but it must be kept clean and free from scale and flux.

FIG. 1: Common Types of Brazed Joints



Continuous conveyor-type forced circulation air furnaces can be used if they meet the above specifications. They should have at least three separately controlled heating zones. The cooling zone at the discharge end should be arranged so it does not affect the temperature of the last heating zone. Conveyors should transport work uniformly.

The success of a furnace brazing production line depends largely on material handling. Once the preparation of parts has begun, they should flow steadily without any kind of interruption or contamination. The work area should be kept clean and all persons handling parts should wear clean cotton gloves.

Parts to be brazed must be furnace heated long enough so they remain at brazing temperature for 2 to 5 minutes to obtain full flow of filler materials. But total time material is in the furnace should be as short as possible and not exceed 15 minutes.

Use furnace temperatures above the melting point of the parent alloy if parts are uniform in thickness and if the time cycle is controlled so assemblies are removed from the furnace before they attain full temperature. After brazing, remove the assembly and let it cool a few seconds until the filler material is completely solidified. The assembly may then be handled freely.

Dip Brazing

Dip brazing employs a bath of molten flux to remove the oxide film and supply the heat necessary to melt the filler. It is used mainly for assemblies such as aircraft intercoolers, heat exchangers, radiators, and other self-jigging structures requiring a considerable amount of joining in relation to bulk.

Dip brazing is suited especially to intricate assemblies containing confined spaces which are difficult to heat uniformly by furnace or manually-operated torch. An important feature of dip brazing is that the buoyancy of the flux bath prevents undue gravity flow and drainage of the molten filler. Assemblies must be designed to avoid entrapment of the flux.

In dip brazing both a furnace and dip pot, which is expensive, are needed.

When dip brazing, a separate furnace is used to preheat the assembly so it will not cool the molten flux bath. A preheating furnace similar to that used for furnace brazing is satisfactory. The furnace should be operated at a temperature of 1000° to 1045°F. Locate it as close as possible to the dip pot so heat loss will be minimized during transfer of assemblies.

The dip pot should be large enough to permit insertion and removal of the assembly from the molten flux without undue turbulence. The volume of

(Continued on page 70)

The **BOEING B-52G triple-threat nuclear bomber** — a major weapon in the current SAC deterrent force—recently carried two big missiles over the North Pole on a 10,800-mile nonstop flight. The flight was another example of a successful effort by the SAC-industry team to provide constant refinement and maintenance of the Strategic Air Command's "big stick" fleet of heavy and medium jet bombers. Designed originally as a platform bomber, the B-52G can now carry, in addition to its bomb load, two North American "Hound Dog" GAM 77 missiles capable of tracking down targets hundreds of miles from their launching point. This makes it possible for the big ship to strike at three entirely separate targets in one raid. The B-52G transports a gross weight of nearly half a million pounds, and Alcoa® Extrusions help carry the load.

Now included in the main wing section are 75-ft extruded 7178-T6 Alcoa Aluminum alloy panels which make possible fuel storage in nearly the whole in-spar area (out to the external underwing fuel tanks). The external fuel tanks provide still additional range.

By shaving some 10,000 lb from the previous model, the B-52G range is increased by about 6 per cent . . . a weight saving accomplished mainly by a redesign of the wing structure. Boeing engineers greatly increased interior fuel storage, replaced fuel bags with an integral wing configuration.

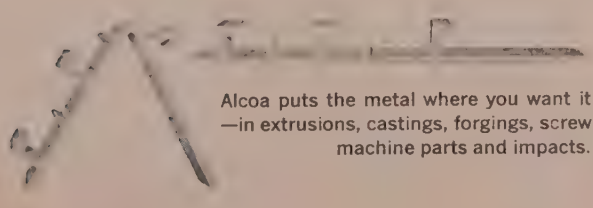
Alcoa Extrusions—in widths up to 35½ in.—are actually extruded for the B-52G in the "V" shape (pictured at right) on one of Alcoa's 14,000-ton extrusion presses. They are then cold rolled into the flattened cross section. The part is sent to Goodyear Aircraft Corporation, Litchfield Park, Ariz., for machining and assembling into a portion of the center wing section. Goodyear, in turn, ships the completed unit to Boeing Airplane Company, Wichita, Kan., for installation in the airplane. Extensive machining, riveting and assembly operations are eliminated by the use of these large extrusions—and the required strength is obtained with less weight than would be

HOW TO CARRY A "BIG STICK" 10,800 MILES!

necessary if the wide section were built up from smaller pieces.

Mammoth presses are only a part of the story. Complex auxiliary equipment, including a 120-ft-long stretcher (with **3,000,000-lb** pulling force), roll straighteners and detwisters, enables Alcoa to extrude shapes that put the metal where it is wanted! With this extrusion equipment, Alcoa can produce closed-end containers up to 44 in. in diameter, stepped or other type extrusions up to 2,500 lb total weight, extrusions up to 39 in. in width, tubing of uniform or variable wall up to 19½ in. inside diameter. In addition to aircraft and other defense applications, large shapes extruded by Alcoa find uses in the electrical industry, pipelines, truck, bus, trailer, ship and architectural construction.

For more information, write Aluminum Company of America, 915-L Alcoa Bldg., Pittsburgh 19, Pa. World-wide sales through Alcoa International, Inc., 230 Park Avenue, New York 17, N.Y.



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ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

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This series of reports on welding aluminum will be reprinted early next year. Subjects covered in this shop manual will include:

WELDING PROCESSES—Characteristics and relative merits of 10 methods are outlined.

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MIG WELDING—applications; equipment; filler alloy; adjusting arc; torch manipulation; trouble shooting.

MIG vs. TIG—relative cost, versatility, weld quality, etc. of these two main aluminum welding processes.

RESISTANCE WELDING—types of machines, electrodes, cleaning methods, etc. for spot, seam, flash welding.

OXY-GAS & METAL ARC METHODS—how to choose flux, filler etc.; jigging; flame control; current control, etc.

BRAZING—when and how to use torch, dip and furnace brazing on aluminum (see article, page 62, this issue).

PRE- AND POST-WELD OPERATIONS—full details on joint design; cleaning, etc.

SUPERVISION AND SAFETY—how to train and supervise your welding personnel.

QUALITY CONTROL—how to set it up and maintain it for best weld quality.

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the pot and its heating capacity must be great enough to prevent the assembly from chilling the molten flux more than 10°F below the selected temperature.

For small installations, heat-resistant glass, silicon carbide or nickel pots are used. Commercial salt-bath furnaces are appropriate for flux-bath operations. Furnace linings consist usually of coke bricks or carbon blocks, laid inside a wall of insulating brick and surrounded by a steel shell. The lining of the dip pot or furnace must be free of moisture. This is accomplished by a long and thorough heating.

Fill With Molten Flux

After the dip pot or furnace has been thoroughly dried it is filled with molten flux. (Flux is usually melted in a separate furnace). The flux bath must be dehydrated, preferably by dipping 1100 or 3003 aluminum sheet into the molten bath. The sheet is attacked, evolving hydrogen which ignites on the surface. Dehydration must be continued until hydrogen is no longer given off. It is necessary when starting a new pot, adding flux or restarting a used pot.

The flux level must be maintained by the addition of flux from time to time. The sludge which forms in the bottom of the pot or furnace must be removed regularly. Pure aluminum or nickel is used to support the assembly in the flux bath.

Consult a welding supplies distributor when selecting aluminum brazing flux. Loss by drag-out may add appreciably to flux consumption and cost depending on the nature of the assembly and its draining characteristics.

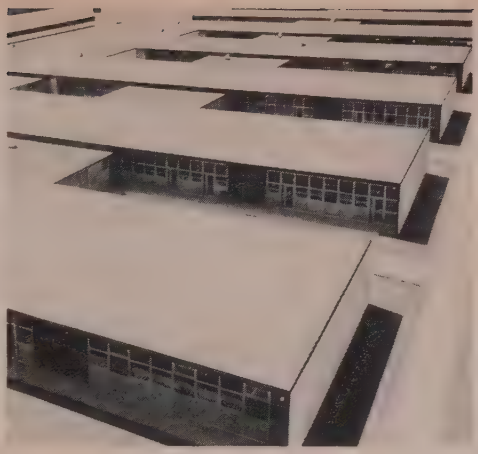
Preparation of material for dip brazing is the same as carried out for furnace brazing. After cleaning, parts to be joined are positioned so the assembly will be rigid when immersed in the flux bath. The assembly is then preheated to approximately 1000°F and immediately placed in the flux bath.

Temperature Range

The temperature range for dip brazing is essentially the same as for furnace brazing. The actual temperature of the bath and the time of immersion are closely related and should be determined by trial. The work should be immersed in the flux bath long enough to obtain flow of filler material. Time may vary from 30 to 180 seconds.

Dip brazed joints are well formed and have excellent appearance. Buoyancy of the bath may cause the development of larger fillets than in furnace brazing but this can be controlled by using less filler alloy and a stop-off compound.

Once the joints have formed, the assembly should be removed carefully from the flux bath, drained, and quenched in hot water.



Engineering laboratories at the new Convair (Astronautics) plant, San Diego. All exterior aluminum is protected against atmospheric staining and oxidation with a clear, colorless coating of Butyrate lacquer.

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Aluminum surfaces, when protected with Butyrate lacquers, require little in the way of cleaning and maintenance. Usually, the action of rain alone will keep the finish clean and attractive.

This combination of features plus resistance to mortar and plaster staining makes Butyrate lacquer especially advantageous for use on outdoor architectural aluminum...siding, spandrels, curtain walls.

Butyrate lacquers are easy to apply by spray or dipping. A single coat provides excellent protection. They are available from lacquer manufacturers in all parts of the country.

An informative 15-minute, 16mm. sound color film has been produced especially for viewing by those who design in or specify aluminum for outdoor use. Would you like to see it? See below.

Butyrate lacquer, applied immediately after fabrication, protects the aluminum-framed sections, manufactured by Metalco, Inc. of Emeryville, California, from mortar staining and abrasion during erection and from weathering afterward.

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2. Check Sweet's Industrial Construction File, Sweet's Architectural File, or see 15-M of the A.I.A. Alphabetical Filing System for specification details.

3. Send for sound color film. Please indicate the date you plan to show the film and an alternate date.

4. Write for names of manufacturers of Butyrate lacquer in your area.

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Engine Blocks Boost *Aluminum's Stake in Autos*

Perhaps more important for aluminum than the increased tonnage in engines is the sharper image it gains as a construction material for cars.

by H. K. Darby, Associate Editor

THAT OLD saying, "One man's meat is another man's poison," never had truer application than to the erosion of gray iron by aluminum in the field of automotive engines. After 60 years of cast iron supremacy, this is the year of the aluminum engine blocks.

Ford Motor Co., with its huge investment in gray iron foundries and its own primary steel facilities, continues to hold out for the heavier metal, though it is well versed in aluminum engine block technology. Studebaker-Packard isn't likely to go to aluminum for economic reasons. However, Corvair's aluminum flat opposed piston engine (actually not a block) started the trend in 1960, and now two leading manufacturers have four more aluminum-engined models on showroom floors.

This isn't all. Chrysler Corp. will put aluminum engines into a certain percentage of their 1961 Plymouths, Valiants, Dodge Darts and new compact Lancers. So it is safe to say that aluminum has substantially widened the market penetration it achieved last model year. For gray iron 1961 promises to be a gray year.

The light metal's improved stature may not spell a startling increase in tonnage used in '61, but the aluminum industry, thanks to the new engine blocks, can count on another substantial boost in annual consumption of its product by the auto makers. Kaiser Aluminum & Chemical Corp. estimates a 14.2% gain in the use of aluminum per car (see accompanying table).

According to V. E. Flaherty, Kaiser's automotive industry manager, estimated net (finished) weight of aluminum components will average about 62.1 pounds per car compared to 54.4 pounds per car in the 1960 model year. Data is based on production of more than 6 million cars during 1961.

"Total net usage by the industry is expected to reach 379 million pounds," Flaherty said. "Aluminum will score its biggest advance in the functional parts, with a major breakthrough in engine blocks. It will boost average net functional usage 7.7 pounds per car."

New "compact" arrivals in the General Motors family include the Buick Special, the Oldsmobile F-85 and the Pontiac Tempest. The first two have 155 hp V-8 aluminum engines as standard equipment. The same engine will be optional in the Tempest which normally has a 4-cylinder iron engine.

The aluminum engine for the Dodge Lancer, an overgrown version of the Plymouth Valiant, is a 101 hp slant-6. The new Rambler Classic, the 1961 version of American Motors' 10 Series line last year, has a 127 hp aluminum straight-6.

The engine blocks for the GM 1961 entries are semi-permanent mold cast at GM's Central Foundry Division plant at Defiance, Ohio. The Chrysler engines are die cast in Chrysler's Kokomo, Ind. plant. Rambler's straight-6 is being die cast by Doehler-Jarvis Division of National Lead Co., Toledo, Ohio. Vital statistics concerning the various power plants are shown on page 74.

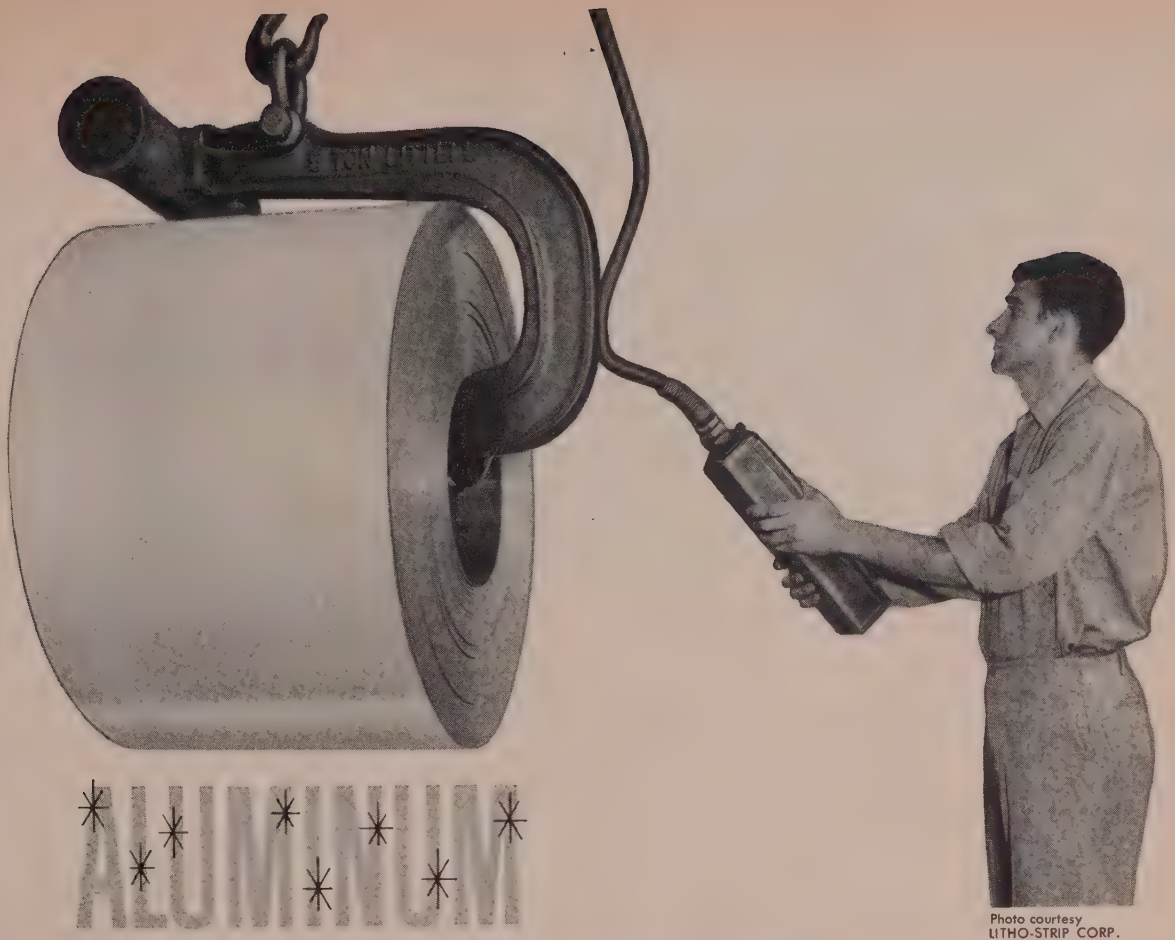
With the exception of Corvair and the possible exception of the Rambler Classic, the sales potential of the new models are problematical. Some 250,000 Corvairs and 295,000 Series 10 Ramblers were sold in the 1960 model year. On this basis these two cars might consume

Average Pounds Per Car 1960 vs. 1961

Car Make	Pounds Per Car Average 1960 (Actual)	1961 (Estimated)
American	31.7	37.5
Rambler	62.0	120.6
Ambassador	78.4	84.0
American Motors	**55.3**	**96.4**
Plymouth	67.8	63.7
Valiant	50.1	45.9
Dodge	75.5	74.6
Lancer	.....	41.7
DeSoto	78.7	72.9
Chrysler	78.9	81.9
Imperial	92.1	82.9
Chrysler Corp.	**68.7**	**63.3**
Ford	59.8	60.5
Falcon	40.7	41.3
Thunderbird	54.8	70.5
Mercury	47.9	54.1
Comet	46.0	46.9
Lincoln	68.7	69.7
Ford Motor Co.	**52.9**	**55.2**
Chevrolet	42.4	44.6
Corvair	106.9	106.1
Pontiac	43.9	43.9
Tempest	.....	40.6
Oldsmobile	43.8	52.2
F-85	.....	134.9
Buick	69.1	70.3
Special	.....	132.6
Cadillac	59.9	63.6
General Motors	**52.3**	**64.5**
Studebaker-Pack.	**17.7**	**25.2**
All Makes	**54.4**	**62.1**

Surveyed by Kaiser Aluminum

■ ***Grilles are a strong application for aluminum, this new model year, though die cast zinc and stainless are still represented. Ford, Plymouth and Ambassador grilles are pictured here.***



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*Bonderite, Bonderized, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

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■ *Aluminum engine blocks, die cast by Doehler-Jarvis Div'n of National Lead Co., are shown palletized ready for delivery to American Motors Corp. where they will be installed in the Rambler Classic Six. Some 64 pounds of aluminum are used.*

62 million pounds of aluminum in '61.

Reynolds Metals believes that the engines to be used by GM, Rambler and Chrysler will add 50 million pounds of aluminum to the auto industry consumption total for 1961.

"These power plants represent the first bite into the billion pounds of increased aluminum consumption expected when the transition from iron and steel to aluminum is completed in American passenger car engines," Reynolds said.

GM's V-8 engine blocks are produced in hydraulically operated semi-permanent mold machines which use both water cooled metal dies and disposable sand cores. The cores are positioned in the mold cavity to form the water jackets and crankcase.

Pre-cast gray iron cylinder liners are heated, placed in the mold, and cast integrally within the block.

"The block-making process is unique in that the castings are poured in a vertical position rather than the horizontal position used in casting gray iron blocks," a Central Foundry Division executive said.

Cylinder heads for the valve-in-head engines are cast in a horizontal position in smaller semi-permanent mold machines. Sand cores are placed in the mold to form the water jacket and ports.

Aluminum is melted in four gas-fired 40,000-pound reverberatory furnaces. Molten metal is then transferred to 1700-pound gas-fired crucibles at the molding platforms and tapped into 100-pound pouring ladles as needed.

After the castings have cooled, gates, risers and sprues are removed in automatic transfer machines. Following machining, the castings are heat treated to relieve stresses and provide dimensional stability.

Quality control is painstaking. Physical property tests and quantometer analyses are frequent. Castings are submerged in water, pressure-tested with compressed air, and gaged for dimensional accuracy.

Engine blocks are processed through an automatic qualifying machine which establishes the starting points for machining, then given a final quality check on a special gaging machine which checks 22 points on each casting.

Machining and deburring the aluminum heads for the GM V-8s created new problems for the three divisions. Whereas cast iron is machined dry, the aluminum alloy (356) requires a coolant after the metal has been heat treated to the T-5 condition.

Advent of aluminum blocks called for completely redesigned cutting tools. Mechanical deburring is an important part of the 400-foot-long head finishing line, which is made up almost entirely of new metalworking and finishing machines.

The Rambler engine blocks are the first production engines to be die cast in the U. S. The aluminum block has a cast iron head, but Doehler-Jarvis hopes to have a producible aluminum design ready in time for the 1962 models.

The centrifugally cast cylinder liners are mechanically bonded to the aluminum by a special process developed by Doehler-Jarvis.

"Cast-in liners are superior to hypereutectic aluminum alloys with unprotected cylinder bores," a Doehler metallurgist asserted. "They wear better. Brinell hardness of the centrifugally cast liners is between 230 and 260 and the higher hardness with the cooler cylinder wall temperatures have reduced the wear on cylinder bores and increased the life of the blocks when compared with gray iron engines with a Brinell hardness of 170 to 200."

The six cast iron liners are preheated before automatic loading in order to prevent thermal shock. Preheating also causes enough expansion in the metal to allow the liners to fit over the core pins.

Close to 65 pounds of molten metal is automatically ladled, then injected into the die under 8000 pounds' pres-

Some Aluminum Engine Specifications

	Buick Special	Olds F-85	Rambler	Corvair	Pontiac Tempest	Plymouth Dart Lancer
Block	alum.	alum.	alum.	alum.*	alum.	alum.
Head(s)	alum.	alum.	iron	alum.	alum.	iron
Type	V-8	V-8	Str. 6	Opposed 6	V-8	Slant 6
How made?	semi-perm mold	semi-perm mold	die cast	perm mold (pressure) cylinder head semi-perm mold	semi-perm mold	die cast
Cyl. block wt. plus heads, if alum. (lbs.)	105	105	64	80	105	115
How cooled?	water	water	water	air	water	water
Compr. ratio	8.8:1	8.75:1	8.7:1	8.1	No Data	8.2:1
Displacem't (cu. in.)	215	215	195.6	145	215	225
Horsepower	155	155	127	85	155	101

*Termed crankcase. Cylinders cast iron.

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USE LIMIT 3200F
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This new ramming mix with extremely low permeability provides exceptional resistance to slag or molten metal penetration. High strength provides good erosion resistance.

MULRAM EF

USE LIMIT 3100F
ALUMINA CONTENT–80%

Similar to Mulram E but supplied in finer grain.

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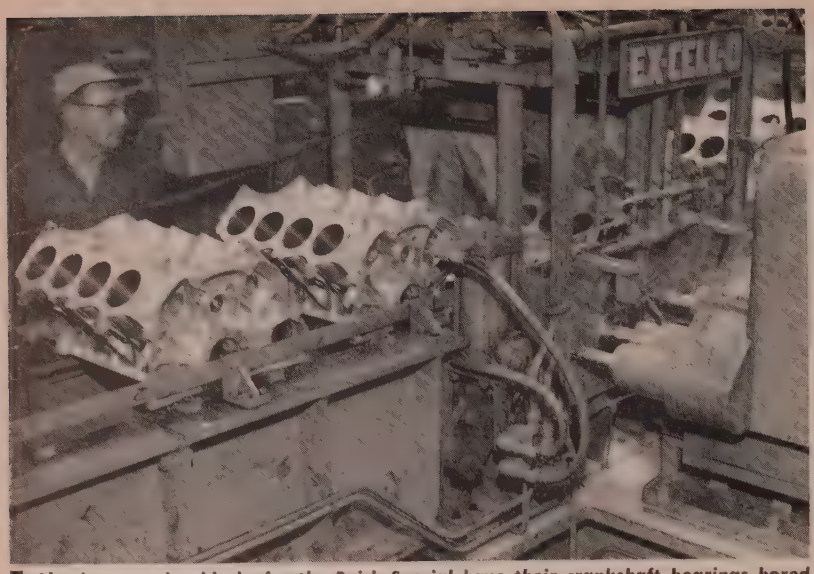


■ ***Aluminum engine blocks for the Buick Special have their crankshaft bearings bored in this modified Ex-Cello-O machine.***

sure. After chilling and ejection, the casting is flushed with cooling water and sent to a mechanized line which removes large flashing. (The operator knocks off small pieces of flash.) Trimming, filing, testing and inspection follow.

Because die casting produces parts to close tolerances, finish machining is minimized. Higher feeds and speeds, plus the fact that drilling is eliminated, are other factors which speed up the finishing job at American Motors.

Facilities Squeeze?

Report is that American Motors is taking steps to speed up the production and finishing of the blocks. With only about 630 blocks coming off the die casting line in an 8-hour shift, the auto firm has had to allocate the aluminum engines to the Rambler Classic Custom 6.

For the balance of the line, the Super and the Deluxe models, the engine is optional. The cast iron overhead valve six engine is standard on the Rambler American Custom model and optional on the American Super and Deluxe series.

Aluminum has gained in other automobile applications. In the Rambler, applications jumped 94.5% over consumption in 1960 models, the Kaiser survey indicated. This new model year, all Rambler automobiles have aluminum grilles and bell housings. Door window frames are aluminum extrusions.

Ford Motor has expanded its use of the metal for transmission cases and front engine covers.

The stamped steel engine front cover of the Ford has been replaced by a cast aluminum cover. "This applies to all our V-8 engines," explained a Division spokesman. "A second gain for aluminum would be in the Cruise-O-Matic transmission (dual range automatic) where the bell housing is cast from aluminum, thus reducing the weight."

Other aluminum parts on 1961 Fords include the one-piece stamped grille, headlamp and taillamp bezels (all with a 250% thicker anodized coating), lower rear quarter panel applique, bell housings on the Fordomatic, and the applique on the lower rear deck area of certain models.

Included among Lincoln's aluminum components are a stamped, anodized aluminum grille for its air conditioner, an optional wheel and brake drum combination, and an interesting new aluminum-plywood combination for interior panels on doors of the Continental.

Called Flexwood, this material is made by United States Plywood Corp., New York, in a choice of 40 domestic and exotic woods laminated to aluminum or steel. In the case of door trim panels the laminations are .015-inch walnut veneer and .020-inch sheet aluminum.

The company markets Industrial Flexwood sheet stock or as-fabricated component parts, complete with the customer's specified finish. "Flexwood is also being laminated to aluminum refrigerator and dishwasher insert panels for use in General Electric and Amana lines," U. S. Plywood reported.

In addition to its aluminum engine, the Dodge Lancer will call on approximately 42 pounds of aluminum in pistons, parts for Chrysler's unique alternator (it's an improvement on the conventional generator), water and oil pump housings, and distributor.

On the other hand, all other Chrysler cars except the Chrysler are indicated by the Kaiser survey to be carrying less aluminum this model year than last.

Although it uses a negligible quantity of magnesium, Chrysler seems to have done more with this material than have the other major auto makers. Lancer's dashboard instrument cluster, for example, is a two-piece die casting with a total weight of 3¼ pounds. While Chrysler is considering magnesium for other parts, both decorative and functional, at least two applications have given way to other materials.

"We used it early in the 1950's for steering post housings — which were later eliminated by a design change — and in some of our convertible top mechanisms," an Engineering Department spokesman said. "Here magnesium was supplanted by aluminum.

"Magnesium has an advantage in economy. Also, it is easier to die cast; it has a fine surface; is lightweight, strong, and easy to machine; and takes a wide variety of surface finishes very well," he added.

Chrysler has now designated magnesium as optional material in its torque converter housings and transmission housings.

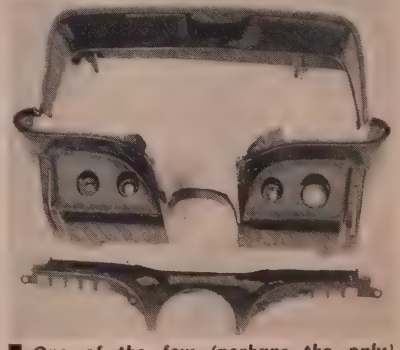
Big Gain in '61

It is hard to realize that aluminum engines have made such strides in two model years. Back in 1957 or '58 one might easily have wagered that aluminum wheel-brake drums would arrive first. As it is, this component seems limited to Pontiac where it is on an optional basis.

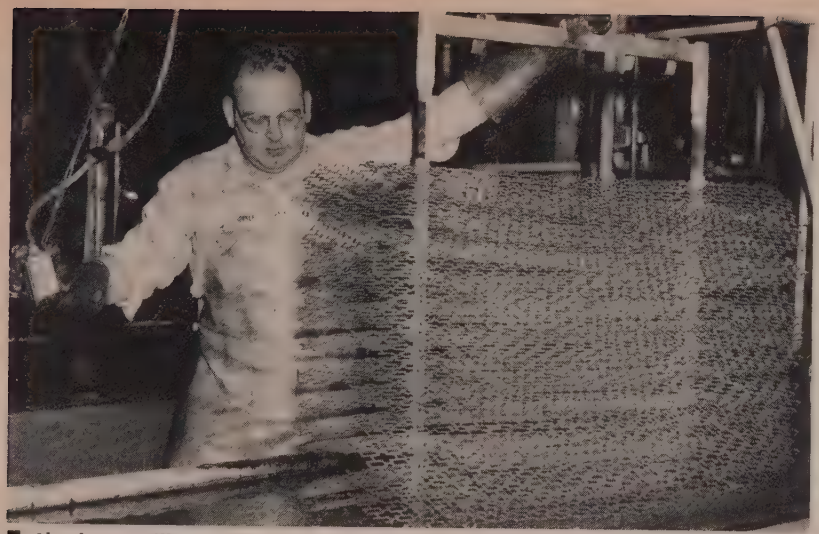
Buick has had an aluminum drum with a cast iron liner for the front wheels since 1959. Kelsey-Hayes Co., Jackson, Mich., does this work, using a low pressure permanent mold process. The Lincoln Continental is reported to have a K-H wheel-brake drum as optional equipment.

Grilles seem to be settling down with aluminum, though stainless steel (Lancer and others) and nickel plated zinc (Imperial) are represented.

Bumpers suffered a setback this model year after optimistic reports had Rey-



■ ***One of the few (perhaps the only) magnesium applications in U. S. passenger cars is this 2-piece instrument cluster for Dodge Lancer. Die castings are painted.***



■ ***Aluminum grilles for the Rambler American are shown here in the final stages of the anodizing operation at a plant of the Mirro Aluminum Co., Manitowoc, Wis. Coiled aluminum is fed through a flattener and a press which perforates and cuts the metal to right length. Blanking machine then shapes the grilles prior to anodizing.***

nolds ready to supply aluminum bumpers to a leading manufacturer. A claim for the Reynolds-developed manufacturing process involving extruded aluminum was that the unit price for long runs fell below chrome plated steel.

Reynolds is positive of the feasibility of the technique and of their ability to compete successfully with steel bumpers, but the auto maker was reluctant to commit itself this year to the quantities that would have assured the low unit price.

Another aluminum bumper (probably stamped) is being tested on a few hundred Pontiacs and other makes. The test period expires at the end of the winter. Meanwhile, a few minor problems await solution. Looks like bumpers have been set back until 1962.

As for radiators, there's little to report, though the Big Three aluminum producers are continuing their research and testing. Corvette, Chevrolet's sports car, is the only U. S. car to have an aluminum radiator. Since this is a luxury car of limited production (about 10,250 in '60), cost of the radiators probably was no object. There seems to be no immediate prospect of popular priced cars going to aluminum radiators.

All in all, engines might represent aluminum's high water mark in the automotive field. Current aluminum engines are only the beginning, with plans now in the making to put larger V-8 and V-6 aluminum engines into the heavier Detroit models.

Such plans tinge the die casting industry, particularly the equipment end, with a rosy hue. Permanent mold casting of blocks would go by the board if high volume engine block production comes to pass. The future of cast iron cylinder liners is problematical, hinging mainly on the economics of die casting and finishing high silicon aluminum.

That plastics are riding the automotive crest along with aluminum is obvious. The '61 models have more plastic components than ever before — about 300 parts accounting for a per-car average of about 22 pounds. This is two pounds more than used in 1960 models. Rambler's fiberglass ceiling is an outstanding example of a new plastic application. Valiant's instrument cluster, made of Delrin, is another.

If plastics is the material for aluminum to reckon with as the choice for decorative applications inside the car, the anodizing process could give the light metal a boost for instrument panels and decorative details — at least for the premium priced models.

Interior applications offer the best possibilities for the use of color anodized aluminum, though price is a real hurdle here.

Compact For How Long?

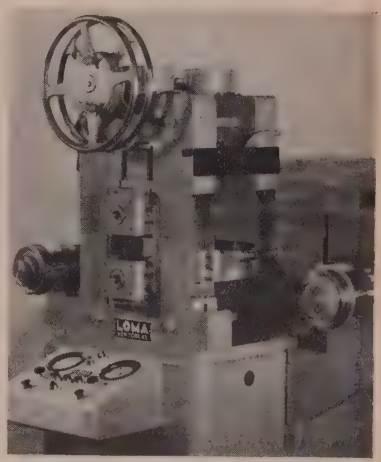
As of this writing, the model year just ahead seems just as cloudy as the industry's product mix is confusing. And how will auto buyers react to compact cars that are growing in size (Comet and Lancer) and standard models that are shrinking?

With their usual optimism, Detroiters say that sales should come close to 7 million. But Birkett L. Williams, president of the National Auto Dealers Association, forecasts sales of only 5.8 million cars. Other forecasters place '61 sales in the neighborhood of 6.2 million.

However, it has been pointed out that it takes a boom year like 1950 or 1955 to send auto sales zooming. Sales of even 6 million cars would be a signal achievement in the soft economy said to be in the cards for next year.

NEWS FROM

LOMA



This rugged and versatile reversing 2-high / 4-high combination mill brings high-precision rolling of thin-gauge ferrous and non-ferrous strip within reach of the smaller re-rolling mill, metals pilot plant and research laboratory. Occupying only 35 sq. ft. of floor space and involving a cost of less than $20,000, the machine handles up to 6 in. wide strip at rolling speeds up to 250 ft. per min. with accurate front and back tension control.

The new 8 in. mill is furnished with two sizes of 4-high work rolls, made of either alloy tool steel or solid tungsten carbide: the 1½ in. size is used for normal cold reduction down to 0.002 in. thickness, and the ¾ in. size allows special ultra-thin finishing to gauges of less than 0.001 in. In the 4-high setup, the machine handles up to ⅛ in. gauge; the 2-high arrangement is used for the hot or cold breakdown of heavier materials up to 1 in. thick, but is also available for skin pass rolling of thin strip.

The production of close-tolerance stock is assured by an exceptionally rugged mill design, employing steel housings of 160 sq. in. post area, super-precision needle roller journal bearings of 175,000 lb. separating force capacity, a heavy-duty mill drive with herringbone gearing and universal joint spindles, and twin-hand-wheel worm drive screwdowns. The machine is powered by a four-speed reversing drive offering constant horsepower from 40 to 250 ft. per min. rolling speed.

The outstanding feature of the new machine is its reversing strip coiling attachment allowing the two-way rolling of strip under tension control with no more effort than a mere flick of a selector switch. Mounted on brackets at either side of the mill, the two coiling shafts carry 8 in. diameter reels designed for a coil buildup of 6 in. Both shafts are driven from the pinion stand and are provided with dual air-operated slip clutches and brakes of ultra-sensitive, low-inertia design. Selective operation through solenoid valves and pressure regulators precisely controls the front and back tensions desired for any given mill pass.

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Bridgeport offers quick service nationwide. Aluminum plants at Riverside, California and Warren, Ohio are supplemented by stocks at Bridgeport's local metal centers. Your Bridgeport salesman, well experienced with aluminum, copper and brass, can help you select the metals and alloys that mean easier machining, forming and fabrication – and better product performance.

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DEEP DRAWING MAGNESIUM

For Containers—Cases—Housings

Zero Mfg. Co. claims to have solved a cost problem for original equipment manufacturers seeking inexpensive deep-drawn magnesium cases and covers. Customers can now purchase short-run or volume production cases in various sizes and shapes without incurring any tooling costs.

By J. M. Dobbie, Zero Manufacturing Co., Burbank, Calif.

THERE was a time when the electronics and other original equipment manufacturing industries were hard put to it in their quest for low-cost deep-drawn magnesium cases and covers for instrument housings, switch boxes and other applications. Problems associated with fabricating magnesium for this type of component were many and varied, but we feel that we have successfully overcome them. Now we can supply both short-run and volume production requirements in a great variety of sizes without any tooling charges involved.

Why Magnesium?

The use of magnesium for containers, instrument housings, military containers and other applications has obvious attractions. We know that magnesium weighs about one-third less than aluminum and that it also has many other inherent properties of advantage to the designer and the end user. We know that the low modulus of elasticity of magnesium gives it the ability to absorb elastic energy and shock.

This ability to absorb shock load, combined with good strength, rigidity, and work-hardening, makes magnesium drawn and fabricated containers resistant to dents, bends, fractures and twists. It is also known that, contrary to some claims, magnesium is actually very safe to work with and in addition has excellent machineability and welding properties. Therefore, it is very adaptable for various end uses. In fact, it has been found that fabricating with magnesium parallels aluminum in many ways.

Obviously, there is a terrific potential for these magnesium products—although the market has just begun to be realized. With the advent of both airborne instrument housings and airborne shipping, the problem of weight along with the other desirable characteristics of magnesium makes it very attractive indeed. So far, today's relatively small market is strictly attributable to the lack of an awareness among potential users of the economical availability of these products.

One of the first obstacles that Zero had to overcome—like other manufacturers getting into magnesium fabrication—was the bugaboo of fire and explosion hazards in working with magnesium. Toward this end, and in all facets of our engineering for magnesium production, Dow Metal Products Co. engineers gave their wholehearted cooperation throughout the entire pilot production planning and fabricating setup.

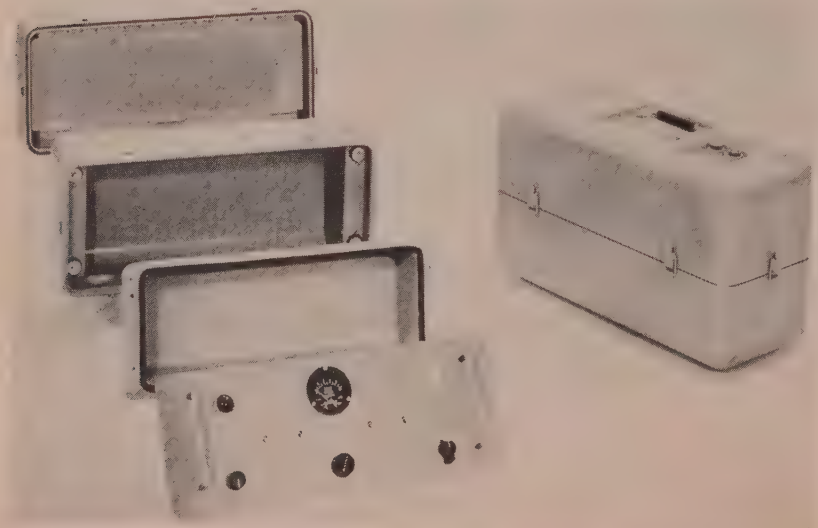
Raw material is purchased from Dow in sheets in various sizes, gauges and alloys, depending upon the end-use application. The raw material is square-sheared to blank size, blanked in a die (or is cut into circular blanks for round boxes and covers) after which the blank go to a Zero-designed machine that automatically applies a proprietary drawing compound similar in specifications to the compound that Zero uses in its deep drawing aluminum operations.

The next step in preparing the blanks for drawing is preheating them. Upon the advice of Dow engineers, it was determined that the magnesium blanks should be preheated to a temperature of about 350°F and kept at that temperature until the magnesium was actually being deep drawn.

Preheating Blanks

The method of preheating the blanks is really quite simple. It consists of a portable gas fired heater, or oven, in which a number of blanks can be kept and heated for fabrication. The blanks are raised into the heater by means of a pneumatic platform and suitable heat is maintained as in an oven by a thermocouple arrangement. The dies are heated by a gas-fired heating ring mounted under the pressure plate to maintain the temperature of the pressure plate about the same as the magnesium blanks. This is a double precaution against the blanks cooling prior to drawing.

(*Continued on page 82*)



■ ***These magnesium cases are used in a missile program. Stock containers range from 1½ inches square by .040 by 7/16-inch to 18-15/16-inch square by .090 by 9 inches.***

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■ *Zero designed and built this gas-fired heater which maintains magnesium blanks at a uniform temperature of 350° F prior to deep drawing. Temperature is controlled by a simple thermocouple arrangement.*

For its magnesium line, Zero uses the same tooling that it uses for fabricating these parts out of aluminum. Zero's deep-drawing technique is known in the trade as "the Zero Method" because the tooling design and set-up in the press is exactly the reverse of conventional deep drawing methods. Deep draw presses range from 100- to 400-ton sizes with bed capacities up to 48 x 48 inches.

The punch is mounted on the bolster and remains stationary. The draw ring is mounted on the ram of the press. The surface of the pressure plate is elevated a few inches above the top surface of the punch.

The Drawing Sequence

In the drawing sequence, the blank is first indexed in position on the raised pressure plate. At the start of the operation, the draw ring comes down and meets the blank nested on the pressure plate forming a sandwich between it and the pressure plate. Pressure for the pressure plate is maintained at about 40 tons and the draw ring pressure is about 60 tons, providing about a 20-ton net drawing pressure which is more than ample for the various gages and depths of draw.

Continuing the drawing operation sequence, the pressure plate and draw ring are forced down over the punch. The resultant pressure causes the metal to flow between the draw ring and the punch. At the completion of the down stroke, the draw ring is raised and the pressure plate strips the part from the punch and it is raised, completing the drawing cycle.

Because aluminum tooling, machines and other fabricating methods can be readily adapted to magnesium fabricating, the company is able to fabricate and to stock a wide variety of magnesium boxes and covers that are readily convertible on an economical basis to the end uses required.

Customers can now choose from about 10,000 different standard sizes in magnesium ranging up from a box size of 1½-in. square by .040-in. thick by 7/16-in. to 1¾-in. height. This height variation in relation to a given width and length dimension of a standard magnesium box (or cover) is due to the trimming operation.

■ *Workman removes deep drawn magnesium shell from press. Pressure plate in press is gas-fired heated to prevent blanks from cooling. Shell will eventually become a case for airborne military electronic instrumentation.*

In the aforementioned minimum box size the height ranges from 7/16 inch to 1¾ inches; and for the given width and length of this box, this range of heights can be furnished in increments of 1/16 inch. These height variations are controlled by a Zero-designed trimming machine which consists essentially of an arbor for mounting the standard box sizes and a cut-off tool in which the desired box or cover height and the cutting operation itself is automatically adjusted and cycled.

The maximum standard magnesium box size available from stock is 18-15/16 inches square by .090 thick and 2- to 9-inch heights. Thus it can be seen that the wide range of widths and lengths plus the 1/16-inch height increments in each standard width and length affords a wide variation of nearly 10,000 sizes from which to choose. The satin-smooth finish of these deep drawn magnesium cases is largely due to the accuracy of the presses, the tooling and the tooling set-up. This produces parts having draft-free straight side walls and smooth surfaces free from draw marks, scratches, and wrinkles.

This stock of standard magnesium boxes and cases is available at both the West Coast facility in Burbank, Calif., and its White Division Inc. in Palmer, Mass.

The secondary metal working operations for magnesium are nearly identical with those used in fabricating aluminum products. This is also a secondary factor in manufacturing magnesium parts on an economical basis.

Original Research, Then . . .

Secondary operations begin with original research and development on package design and engineering, plus tool design when required. The company's large welding facilities are fitted for any type of custom work on standard boxes and covers.

For example, a customer may want a standard magnesium box and cover customized for a particular use involving such secondary operations as: perforating, drilling, louvering, and similar operations — all of which can be performed by our own facilities and methods. Various other components may be required, together with their manufacture and assembly, such as hinges, latches, handles and the like.

The company has also recently delved into the field of bonding with epoxies quite successfully.

As yet, aluminum bonding methods have not been widely applied to magnesium, although the same methods

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combines the seasoning of experience with the vigor of far-sighted research. Long a supplier of basic coatings and finishes to American Industry, DeSoto has pioneered in new and advanced uses of finishes for metal products . . . tested and proven in DeSoto laboratories, among the largest in the nation. Today DeSoto leads in supplying industry tested coil coatings that retain their original beauty. You can depend on DeSoto coil coatings to withstand the strain of fabrication without deformation, marring, loss of adhesion or formability. In today's swiftly advancing technology, new types of coil coatings are constantly required. DeSoto's vigorous research and production teams all over the country* are maintaining our tradition of looking into the future—and being ready for each new challenge from American Industry. Our field engineers will gladly call to give you the details on ACROPON, the proven thermosetting acrylic featuring maximum durability, excellent forming properties —and KOROLITH, a superior baking finish for specialized end uses.

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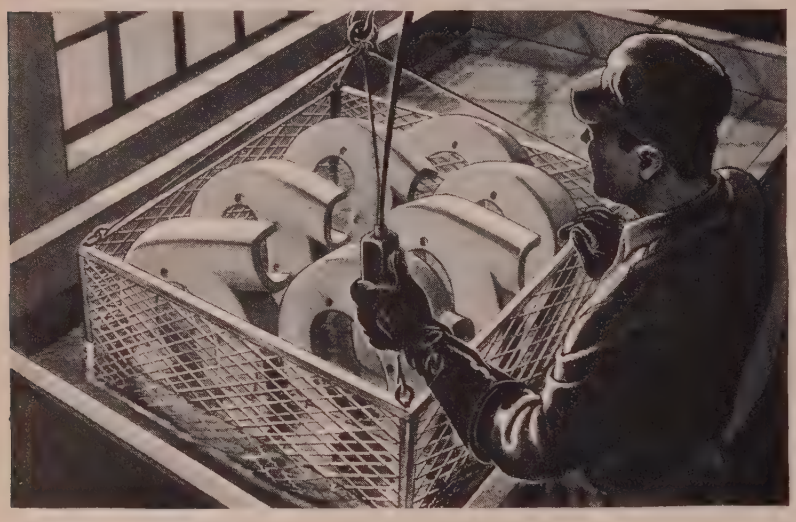

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would apply with the exception of surface preparation. Zero uses an epoxy resin developed with the cooperation of the Adhesives, Coatings and Sealers Division, Minnesota Mining & Manufacturing Co., St. Paul.

The epoxy is applied to grooves in extrusions and corner castings which form the framework of special cases, while the panels or sides of the cases fit into these grooves. Two Zero-designed machines apply the epoxy.

Tensile Shear Tops 4600 psi

Tensile shear strengths of bonded parts range over 4,600 psi. Bonding is unaffected through a temperature range of −67°F to +250°F. Curing requires an hour at 350°F. There are no volatile by-products. Shrinkage is practically nil and the resin sets up to form a hard structure with about the same coefficient of expansion as the metal itself.

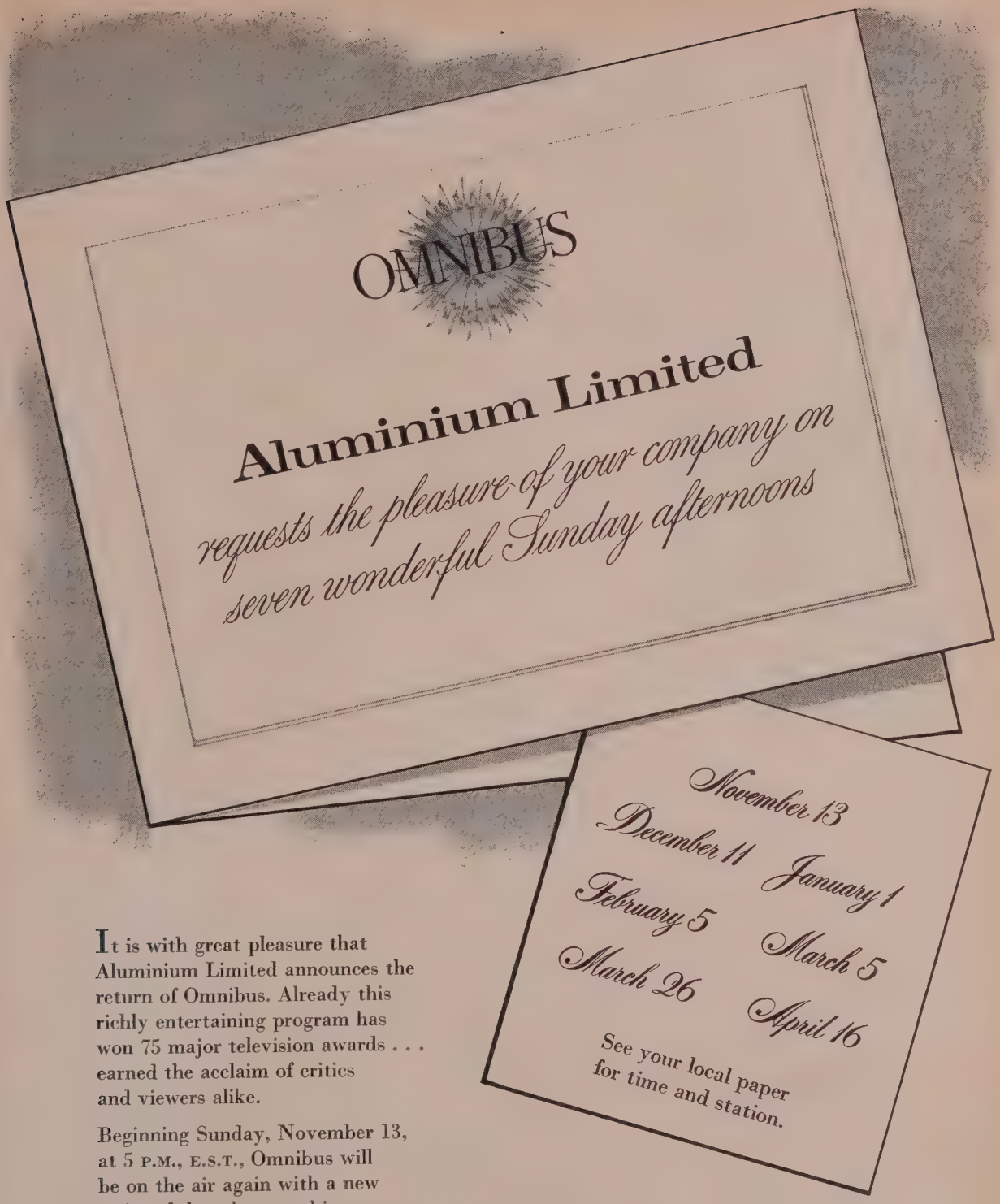
Other secondary facilities include a finishing department for painting, enameling, Iriditing and finishing; and a department for silk screen and engraving requirements. Finally, the company has a special quality control department to make sure that the product complies with military specifications.

The Zeriold Mfg. Co. became Zero Mfg. in 1952, when the present management purchased the company. At that time the company was primarily engaged in fabricating aluminum for the aviation industry. The company revised its marketing strategy when the electronics industry's huge potential was foreseen. Today, about 95% of its nearly $6 million annual sales is to the electronics industry.

12,000 Standard Sizes

Today, the company stocks more than 12,000 standard sizes of deep drawn aluminum boxes and covers: six basic sizes of deep drawn instrument housings in a full range of lengths; several thousand combinations of 40 basic lengths and widths of military transit/combination/instrument cases; commercial carrying cases; Zero "Alply" military packaging, which consists of a bonded aluminum skin over a plywood core. The company has also recently gone into modular packaging systems in which reusable shipping and storage containers are fabricated to strict military and naval specifications.

Besides the missile, aircraft and electronic fields, we believe that the popularity of battery-operated portable TV sets will greatly increase, probably leading into widespread use of magnesium to hold down weight of various components. In addition, magnesium will play an important role for packaging portable telephonic and communications equipment.



It is with great pleasure that Aluminium Limited announces the return of Omnibus. Already this richly entertaining program has won 75 major television awards . . . earned the acclaim of critics and viewers alike.

Beginning Sunday, November 13, at 5 P.M., E.S.T., Omnibus will be on the air again with a new series of thought-provoking pieces . . . brought to you for the 6th season by one of North America's great aluminum producers. Aluminium Limited Sales, Inc., 630 Fifth Ave., New York 20, N. Y.

Aluminium Limited ALCAN

New Anodizing Process Imparts Uniform, Fade-Proof, Built-In Colors

These and other advantages are claimed for Kaiser Aluminum's new Kalcolor anodizing process. Organic dyes are not used; hues are created by converting alloying elements in the metal. Licensed firms see principal markets in architectural applications.

A NEW anodizing process which creates a wide range of colors for architectural aluminum applications is being introduced by Kaiser Aluminum & Chemical Corp.

The process produces an anodic coating with a variety of colors and a high degree of color stability and uniformity. Developed by Kaiser's Department of Metallurgical Research, Spokane, Wash., the process has been under test for more than four years.

Called Kalcolor, the new anodizing process produces color without using organic dyes. Lasting tones are created by converting alloying elements within the metal itself. Since tones result from a reaction of alloying elements within the metal, excellent color uniformity is said to be achieved from one anodizing batch to the next.

Colors are available in 13 shades of gold, amber, tan, brown, olive, gray and black. All colors can be used on sheet and four can be used on extruded sections. The firm claims color of extrusions can be matched to that of sheet.

Kalcolor was developed specifically for use with Kaiser architectural alloy extrusions and sheet for commercial construction. It is available through licensees including:

Engineering Products & Specialties, Inc., Dunnell Lane, Pawtucket, R. I.; Fentron Industries, Inc., 2801 Market St., Seattle, Wash.; Hardco of California, Inc., 1235 Fifth St., Berkeley, Calif.; King Anodizing, 2905 Winona Ave., Burbank, Calif.; H. A. Leed Co., Dixwell Ave., Hamden, Conn.; and North American Extrusions Corp., 5569 No. Riverview Drive, Kalamazoo, Mich.

Resists Sun, Wind, Rain . . .

Outdoor tests exposed processed aluminum to sun, wind and rain. More than three years of such exposure in various sections of the country caused no perceptible fading or corrosion in test panels, says Kaiser. Color measuring procedures used were established by the United States Bureau of Standards.

Field stations were located in a coastal marine environment, in a severe industrial atmosphere, and at Phoenix, Ariz., a site counted among those having the greatest intensity of sunlight in the nation.

There also was no perceptible fading or corrosion of Kalcolor during accelerated tests, which included salt spray exposure of 15,000 hours, water fog for 7000 hours, and high intensity ultra violet ray exposure for more than three years, claims the firm. The latter test is equivalent to 20-30 years of exposure to sunlight under normal conditions. This testing was conducted under American Society for Testing Materials procedures.

Abrasion and Corrosion, Too

F. A. Loebach, Kaiser manager of architectural sales, says tests also revealed that corrosion and abrasion resistance of the new coating is "decidedly superior" to that of conventional anodizing processes for architectural aluminum, and compares favorably with the most abrasion resistant industrial anodic hard coatings. A 20 to 40% greater intensity of coating over the best architectural anodizing process now in use is achieved, depending on alloy, he added.

The Kaiser program for the process included development of special mill practices for architectural alloys which make the metal particularly well suited for the new treatment.

King Anodizing, one of the licensees, conducted its own tests, on a production basis, last year. It says it has been able, "with little or no difficulty, to match colors from piece to piece and from day to day."

King says markets for the new process include store fronts, monumental structures, marinas and ornamental work. William J. Saunders, general manager, says, "We have completed store front and curtain wall projects so far, and we, and the architects, are pleased with the results."

Porce-Len Inc., another licensee, has installed a line to handle parts 27 feet long and 6 feet wide. It will be used primarily for job finishing of curtainwall modules. Main advantage of the process, according to this firm, is that its hard, abrasion resistant finish simplifies handling of curtainwall units in the field.

For Hardware, Furniture

Adam Walsh, of Porce-Len, feels that in addition to becoming popular in the architectural field, Kalcolor will find wide application in the hardware industry, and in the manufacturing of interior furniture.

Robert M. Cotter of Fentron Industries was somewhat reluctant to comment on Kalcolor since the firm had not yet finished its installation. However, after a preliminary evaluation, Cotter said, "We feel that Kalcolor will lend itself very well to curtainwall work and expect that it will soon have wide architectural acceptance."

North American Extrusions was to have completed its pilot line in May and plans to have its large tanks operating by late fall.

Best Coloring Process

R. L. Rizzardi, general sales manager of the company, explains that North American carefully investigated the process for marketing possibilities and to see how well the colors would stand up in architectural applications. The firm's conclusion is that "Kalcolor is the best new process available for coloring aluminum."

Rizzardi says: "We plan to promote the new process not only for architectural usage, but also for use in the appliance, automobile and other such industries. It is clearly capital investment on our part, but we definitely feel it will be worthwhile."

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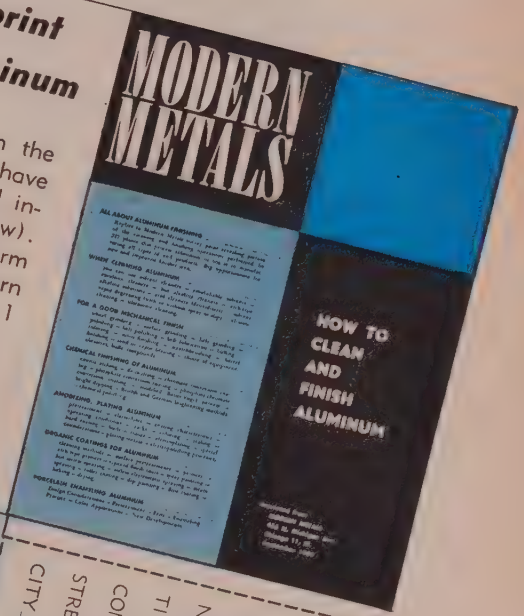

ALL ABOUT ALUMINUM FINISHING
Replies to Modern Metals survey paint revealing picture of the cleaning and finishing operations performed by 327 plants that process aluminum or use it in manufacturing all types of end products. Big opportunities for new and improved finishes seen.

WHEN CLEANING ALUMINUM
you can use solvent cleaners – emulsifiable solvents – emulsion cleaners – hot alkaline cleaners – etch-type alkaline solutions – acid cleaners (deoxidizers) – solvent vapor degreasing (with or without spray or dip) – electro-cleaning – ultrasonic cleaning.

FOR A GOOD MECHANICAL FINISH
wheel grinding – surface grinding – belt grinding – polishing – belt polishing – belt lubrication – buffing – coloring – satin finishing – scratchbrushing – barrel finishing – sand or vapor blasting – choice of equipment, abrasives, buffs, compounds.

CHEMICAL FINISHING OF ALUMINUM
caustic etching – desmutting – chromate conversion coating – phosphate-chromate conversion coating – phosphate conversion coating – modified Bauer-Vogel process – bright dipping – British and German brightening methods – chemical polishing.

ANODIZING, PLATING ALUMINUM
pretreatment – electrolytes – coating characteristics – operating conditions – racks – coloring – sealing – hard coating – built-in colors – electroplating – special considerations – plating metals – electroplating processes.

ORGANIC COATINGS FOR ALUMINUM
cleaning methods – surface pretreatments – primers – etch type primers – types of finish coats – spray painting – hot airless spraying – airless electrostatic spraying – steam spraying – roller coating – dip painting – flow coating – baking – drying.

PORCELAIN ENAMELING ALUMINUM
Design Considerations – Pretreatment – Frits – Enameling Practice – Color Applications – New Developments.

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Stud Welding System Speeds Curtain Wall Production

Great speed and versatility are claimed for this stud welding system which is used in mass production operations in heavy industry, yet welds the thinnest gauge aluminum — even eyeglass frames — without distortion.

By H. P. Blood, Omark-Graham Industries, Portland, Ore.

A STUD welding technique can be said to qualify for that tired old term, "versatile," when it can be used with equal effectiveness for "grown-up" assignments such as automotive and building industry jobs and miniature joining work, too.

One such system has been gaining in effectiveness over the past 12 years in modern fabrication and building. Called the Omark-Graham system of stored energy percussive stud welding, it is particularly suited to high-speed, mass production techniques used in the assembly of buildings, elevators, automobile sub-assemblies, utensils, tanks, siding, roofing, insulation for building walls and ductwork, and perhaps many other applications as yet undeveloped.

It has also been used to weld aluminum studs to the frames of hearing-aid eyeglasses.

The system offers production rates in some cases 20 to 30 times faster than they were previously. The need for operator skill is minimized, with the high degree of automation and repeatability of the system.

The aforementioned eye glasses, which were made of X5457-H34 aluminum, were successfully welded without annealing the opposite side of the frame. Vinyl covered panels in modern jet airliners can be welded successfully with no discoloration of the plastic. The intense welding heat of the arc is of extremely short duration and is directed to the work with such pin-point accuracy that extraneous heating, such as found in other types of welding, is completely absent.

Weld Delicate Parts, Too

One of the more amazing aspects of the O-G system is selectivity. The thinnest of skins can be welded with no distortion, wrinkling or stretch. A case in point is an aluminum alloy honeycomb skin only .006-inch thick, successfully welded with no distortion.

Many plated, painted, anodized, and plastic-coated sheets have been rapidly welded with O-G welders without any evidence of welding on the opposite side. An example is a shock mounting for the shipment of transmissions. Studs were welded to rubber-bonded clips with no harm to the bond.

The stored energy, which is released rapidly, is combined with carefully controlled arc length and stud travel from gun to workpiece to offer great speed and convenience of operation.

No flux of any sort is required. A patented, cylindrical work tip in the welding face of the stud starts and times the arc when it contacts the workpiece. The tip vaporizes from the large current load, ionizing the air gap. The main welding current discharges an arc which is automatically timed by the tip length. The arc melts the face of both the stud and the workpiece, fusing them together with percussive force.

Energy for welding comes from a capacitor bank capable of delivering 300,000 amperes per square inch of stud cross-section. Recharge time is about eight tenths of a second.

Current flow is varied in two ways. The number of capacitors in the circuit can be reduced or increased, or the input voltage can be changed.

Although large, instantaneous cur-

■ *How stud welding serves the curtain wall industry: Insul pins have been stud welded onto back of aluminum panel to take insulation batting (see insert, left). Worker is shown adding spacers to insul pins. In center larger photo, worker is laying insulation batt over insul pins. In the insert, insul clip is shown as it is pressed over each pin to serve as permanent, removable retainers for the insulation. In right photo, insulated curtain walls are going into place.*

rent flows, the time period is very short. The entire welding cycle occupies less than one millisecond. This demonstrates that the total welding energy consumed is small. The welding potential is low, of the order of 80 to 90 volts, d.c.

Versatile Tool

Flexibility of use is one of the main reasons for the O-G system's popularity. It is feasible to gang two or more welding guns, and weld entire patterns of studs, using precise locating fixtures. Guns can be operated either singly or collectively if frequent production changes make this necessary.

Although major use of the system to date has been with aluminum, brass and steel, it is completely feasible for magnesium and titanium. Developments in the welding of more exotic metals show great promise.

In addition to the multiple-gun bench models available, many applications have been found for portable equipment and hand-held, trigger-operated welding guns.

Modern aluminum curtain wall construction is made more efficient by the O-G system. Use is made of the system for fabrication and assembly of windows, mullions, clad panels of all descriptions, porcelain-enameled ware and appliances, casings, lath, aluminum siding, sills, frames, and other building components.

When the curtain wall system for the new Kaiser building was installed last year in Oakland, Calif. by Kawneer Co., the Omark-Graham system was used extensively. Two types of O-G aluminum studs were used on the anodized aluminum curtain walls. "Insulpins" were welded to the panels to hold insulation in place, and aluminum (1100 H-18) ¼"-20 studs were welded to panels to hold stiffeners in place.

In the Future . . .

Future developments promise, among other things, increased portability, due to separation of the welding unit into modular, hand carried packages, lighter weight due to improved design utilizing latest components, and an increased range in power with more capacitor storage available in the form of plug-in units.

Separate developments and research indicate promising applications in micro-miniaturization, and "plug-in" welding guns which will permit an infinite variety of weldment patterns to be employed without major retooling.

Engineering personnel at Omark Industries, the Portland, Ore. firm manufacturing the system, have dedicated future system development energies to rapid, economical fabrication of the newest high strength, low weight metals.

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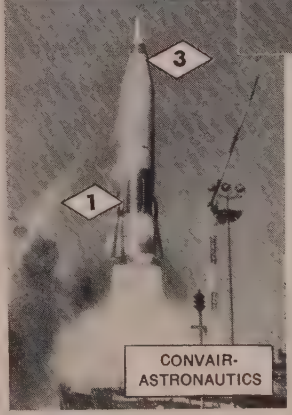

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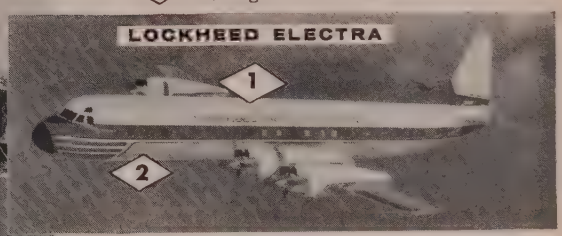

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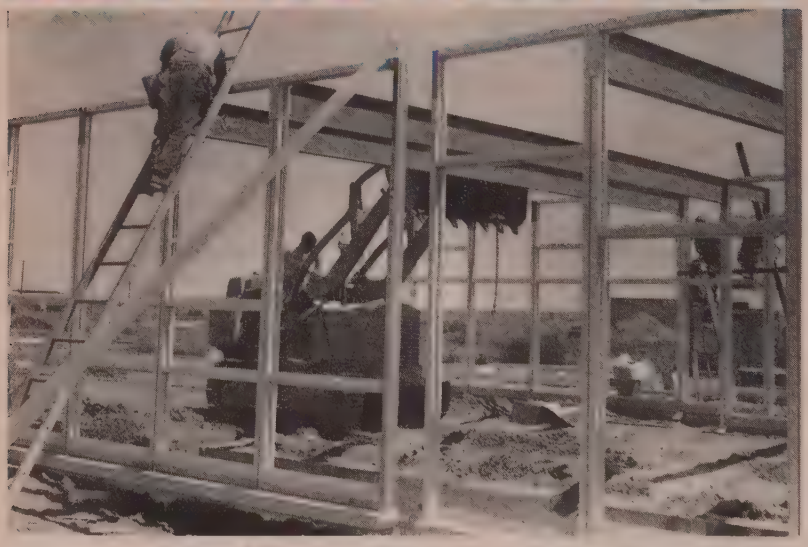


Aluminum A Load-Bearing Element in School Construction

A building component made of aluminum extrusions performs the functions of structure and closure in constructing one-story buildings says Functional Structures Inc., Chicago.

Called Modu-Frame, it looks like a conventional curtainwall. But curtainwalls are only decorative, and must be attached to a structural steel framework which also holds up the roof. Modu-Frame is a structural element which supports the roof, and also clads the building, holding glazing, paneling, etc. No other structural members are needed.

The system was developed to reduce school construction costs. However, it has proved so flexible it is being adapted to other uni-level structures. Costs are cut because units are mass produced, allow modular planning, and can be combined with other standardized building components and fasteners.

Frames are made entirely of aluminum extrusions, with the most important shape being the load-bearing vertical members. This extrusion is used in 9½-foot lengths. Its cross-section measures 4-inches deep with a ⅛-inch wall thickness, by 1¾ inches wide with a ⅜-inch wall thickness. Reynolds Metals Co. extrudes all components from aluminum alloy 6063-T6.

By bolting frames together, adjacent vertical members form 4-inch square load-bearing columns. These columns will support 32-foot steel beams, and 312 pounds per square foot of roof and superimposed loads. Frames come in two standard sizes — both 9 feet 6½ inches tall but one 4, the other 8 feet wide.

The Modu-Frame structural-cladding system is being used on a variety of buildings. These include the Fred H. Schaub Engineering Co. plant in Downers Grove, Ill., Wonderly Office Building, Minneapolis, Minn., Glenview Covenant Church, Glenview, Ill., and Hugoton Jr. High School, Hugoton, Kan.

Erection of frames for the Hugoton school is shown above. The building required 279 frames, weighing a total of 24,000 pounds. All frames and 32-foot roof beams were erected in four days.

Functional Structures has sales and engineering offices in Chicago and Philadelphia, and 25 distributing outlets located across the country.

Magnesium Tooling Material Used for Diazo Reproduction

A new tooling material, magnesium phototemplate and layout sheet, is recommended for both the diazo and blueprint methods of reproduction by the Dow Metal Products Co., Midland, Mich.

Though the product is now available, development is continuing to make it acceptable for photographic reproduction methods. It is supplied chemically treated with a chrome pickled surface ready for priming or coated with a primer of the user's choice.

The tooling material is said to have excellent flatness, and to have the following advantages: Lightweight, ease of machining, good paint adhesion, dimensional stability, alkali resistance.

Magnesium is furnished in widths up to 60 inches, lengths up to 168 inches and thicknesses up to 0.090 inch.

Specialty Products Fabricator Expands

Important advantages will be gained in Aluma Kraft Mfg. Co.'s operation of its new plant at 1030 Manchester Rd. in St. Louis County, Mo. T. J. Bottom, Aluma Kraft president, said that the demand for aluminum residential building products has grown tremendously and that the new 40,000 square foot facility will allow the firm to install more modern production methods and an improved inventory control system.

Founded in 1946, Aluma Kraft manufactures painted and roll formed aluminum building products, including step-down awnings, baked enamel siding, patio and carport structures, soffits, fascia and rafter vents.

Plans call for the transfer of a 14-inch wide siding roll coating line and 48-inch wide awning roll forming equipment from the main plant at 1330 No. Rock Hill Road, Webster Groves, Mo. Manufacturing operations will continue at both plants, however, raw material storage and end product inventories of both cut-to-length and standard lineal length products will be controlled at the new plant.

Cast Aluminum Game Table Encourages Orderly Play

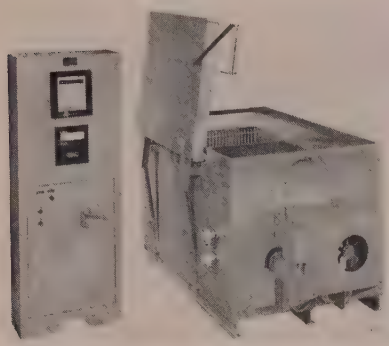
The fact that designer Gene Tepper is a chess player doubtless contributed to the design of this game table, one of the recent additions to the Forecast Collection of Aluminum Co. of America.

Playing chess at a small, conventional game table invariably presents the problem of where to keep captured pieces. Other games may be more or less troublesome, but smoking and drinking in the course of the game add to the hazards.

The multi-planed, compartmented top is a single aluminum casting. Table legs, as well as the legs and bodies of

the companion chairs, are also cast in high-strength aluminum alloy. The table utilizes three aluminum boards for chess, checkers, Chinese checkers, and the Japanese game, go. Even the chess pieces make use of aluminum. These individually designed pieces have turned aluminum bases for the hand-carved wood bodies.

Table and chair components were cast in alloy 356, and heat treated.



Furnace Controls Extrusion Die, Bolster Temperatures

Forced air recirculation in its new furnace insures uniform temperatures in extrusion dies and bolsters, claims Granco Inc., 317 32nd St., Grand Rapids 8, Mich. An electronic control system is said to maintain exact temperature control to 1000°F.

Refractory construction of the die and bolster furnace is said to have a long service life, thereby minimizing maintenance and furnace downtime.

West Indies Fabricators Corrugate Aluminum Sheet

Two recently created and fully-owned subsidiaries of Aluminium Limited in the West Indies have established new aluminum fabricating plants. One is located in Kingston, Jamaica, and is owned and operated by West Indies Aluminium Products Ltd. The other, situated near Port of Spain, Trinidad, is owned and operated by Sprostons (Trinidad) Ltd.

Both plants will produce corrugated aluminum sheets and auxiliary rainwater goods for local markets, and adjacent territory. The two factories, expected to begin production shortly, will have a total annual capacity of 3000 tons.

In addition to operating one of the new fabricating plants, Sprostons of Trinidad will act as sales agents for Alcan products in the area. Another subsidiary, Sprostons of Jamaica, acts as sales agents there as well as being a trading company.

Both companies are agents for Saguenay Shipping Ltd. — the shipping arm of Aluminium Ltd.

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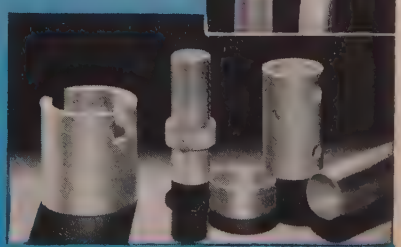

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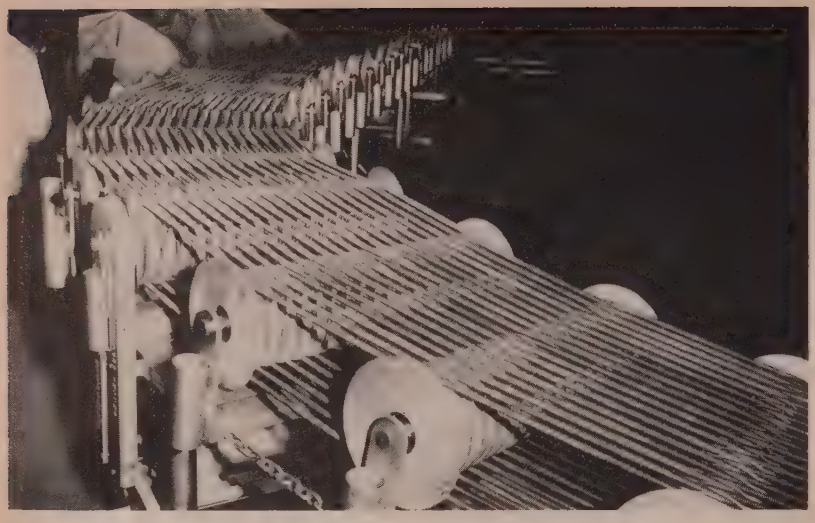

Aluminum Fosters Conveyor Flexibility

The use of cast aluminum in the manufacture of flexible powered conveyors has significantly improved machinery and lightened the unit weight, according to a leading producer.

A. D. Penn, of the Power-Curve Conveyor Co., Denver, Col., reported that these factors have been, "to a large extent," responsible for considerable sales growth of the company's powered conveyor products.

Originally producing the conveyor rollers from sheet steel, problems arose regarding both weight and operating efficiency. Designed as highly portable, flexible loading devices for boxcars, trucks and storage, the units weighed more than was desired. In addition, Penn said, the power belt grooves had to be pressed into the sheet steel — thus limiting the depth of the groove. As a consequence, Penn pointed out, the spring belts had a tendency to ride out of the groove and become tangled with adjacent belts.

"An aluminum smelting firm was called in to tackle the problem and recommended a switch to cast metal rollers made of aluminum alloy 319," Penn said. "They pointed out that cast aluminum would not only serve to shave weight but would also permit much deeper grooves to be made in the rollers, ensuring more secure belt action. In addition, the smelter alloy is capable of machining and at the same time is able to resist abrasion by the steel spring belt."

Operating its own foundry Power-Curve launched into production of cast aluminum rollers and found immediate improvement in the operation of its diversified line of conveyors. Moreover, he reports, there was a substantial decrease in production costs. He adds that the aluminum represents about 60% of the over-all product cost.

Typical of the firm's several types of loading and handling equipment, is its flexible device developed for boxcar and truck freight (pictured). Capable of delivering bags, etc., right up to the point of loading, eliminating hand trucking, the unit can change direction up to 90° while under power and can bend around a boxcar door to take goods into the rear of the car. As loading progresses, the conveyor is retracted and the flow of goods continues without interruption at a rate of up to thirty 200-pound bags per minute.

In this manner, the devices are said to cut loading costs in half. They are the first such units that can be curved to 90 degrees under power and which can be adjusted to varying degrees without stopping the motor. Completely reversible — for loading or unloading — the conveyors automatically adjust to the varying heights of loading docks, trucks and boxcars.

Reynolds Broadens Building Market Base

Negotiations are almost complete for the merger of Reynolds Metals Co. with Tilo Roofing Co., manufacturer and distributor of various types of asbestos and asphalt building products.

Under terms of the proposed merger, one share of Reynolds convertible $4.50 second preferred stock would be exchanged for 5¾ shares of the common stock of the Stratford, Conn., firm.

Officials of the two companies said that the proposed merger is subject to approval of the boards of directors and stockholders of each of the firms and to certain other conditions which were not disclosed.

Giant Press to Extrude Shapes 14 Inches in Diameter

What is claimed to be the world's largest self-contained aluminum extrusion press will be installed in a new building being added to the Reynolds Metals Co. Bellwood Extrusion Plant in Chesterfield County, Va.

The aluminum-covered addition to house the new press and related equipment will add about 1¼ acres of floor space to the existing plant and will cost more than $1 million.

The new press, to be supplied by Watson-Stillman Press Div'n, Rochester 10, N. Y., will enable the plant to extrude shapes up to 14 inches in diameter. Such shapes could be used for light standards, railway car sections, truck and trailer body sections, tubing, conduit and wall panels for use in large buildings.

The Bellwood addition will bring the facility's monthly production capacity to more than 3 million pounds of extruded products.

The new press will be able to exert a 9 million pound push, or about 3000 psi. It is called a self-contained press because it incorporates built-in equipment to compress oil to pressures which make possible exertion of the enormous force.

300-Ton Impact Press Extrudes 120 Cans a Minute

Seamless aluminum cans can be impact extruded at the rate of 120 per minute on a 300-ton impact extrusion Maxipres recently unveiled by National Machinery Co./ Tiffin, Ohio. The press is being shipped to a Western brewery who does not want to be named.

The 48,000-pound press produces 5-inch high cans from discs ⅛ inch thick and 2½ inches in diameter (above). A simple die adjustment varies the bottom thickness of the can while the press is running. A tonnage indicator shows tonnage generated during operation, and the press is claimed to be safe from any malfunction.

Pulsating Gas Burners Cut Fuel Costs, Overhead

Pulsating gas burners in two 15,500-pound capacity aluminum reverberatory furnaces have resulted in gas and operating expense savings in the die casting foundry of Hoover Co., North Canton, Ohio, appliance manufacturer.

The burners, manufactured by E. W. Bliss Co., Canton, Ohio, use forced air at 3 psi and a special refractory liner to produce virtually perfect combustion of the natural gas fuel. Gas consumption at Hoover averages 1.3 cubic foot per pound of aluminum melted from a fresh charge following a tapping.

One furnace operator now handles both new furnaces equipped with the burners, as compared to the two operators needed for each of the old-type furnaces. This is a result of efficient melting and the minimum maintenance needed. For example: Flame cleanliness eliminates hydrocarbons which increases refractory life, says Bliss.

Each furnace at Hoover is heated by two No. 3 Bliss aspirator-type burners. During charging and melting, which take 4½ to 5½ hours, the temperature is maintained at 1350°F. Tapping and pigging take from 2 to 2½ hours. Upwards of 6200 five-pound pigs are cast every day.

The flame produced by the burner is actually an extremely rapid series of explosions. The flame is controlled by adjusting the air and fuel flow, which can be either gas or oil.

Burners can generate flame temperatures as high as 3450°F when burning oil, and above 3300°F with 1000 BTU natural gas. These high temperatures and the burner's high heat release rate — 5,500,000 BTU per cubic foot of combustion volume — are making gas and oil available for use on many new jobs, says Bliss.

The firm adds that fuel savings ranging from 12 to 30% have been reported by users.

Die Casting Quench Stops Water Corrosion

A new die casting quench eliminates scumming, foul odor, chip and dirt floatation and blistering rejects due to water corrosion says Northwest Chemical Co., Roselawn Ave., Detroit.

Four Star Quenching Compound is usable on both aluminum and zinc castings. The company claims it requires no heating, special tanks or equipment, won't turn rancid, remains stable under production heat build-up and retains its efficiency over many die changes, thus cutting replacement costs.

The compound leaves a water repellent residue claimed to be too thin to affect accurate gauging but which prevents oxidation of parts stored as long as three months, and prevents water oxidation of parts exposed while awaiting plating.

Parts quenched by this method do not require blow-off of redeposited chips and soil after removal from the bath since there is no blanketing foam or scum at operating temperature. The firm also claims cleaning of castings prior to plating is simplified and bacteria and odors are eliminated.

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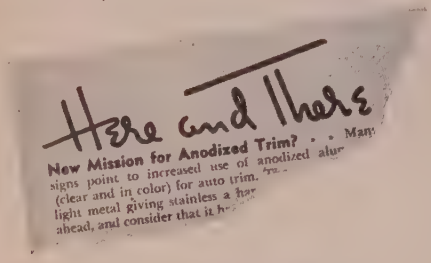
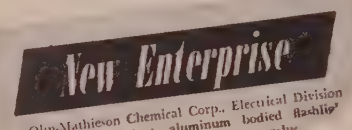

Here and There

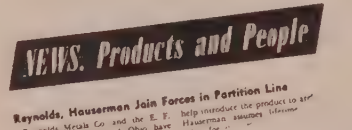
New Mission for Anodized Trim? . . . Many signs point to increased use of anodized alu (clear and in color) for auto trim. light metal giving stainless a ha ahead, and consider that it h

Useful Data

Over 100 buffing and polishing compounds are described in Bulletin Co-103 of the Hanson-Van Winkle Munning Co., Matawan, N. J., manufacturer of a plete line of finishing equipment and supplie page, two-color bulletin has a full coloring, and

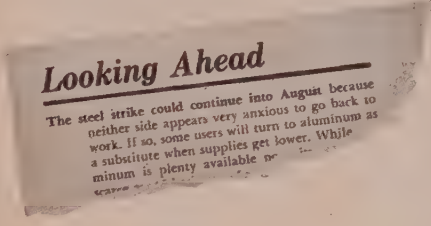

New Enterprise

Olin-Mathieson Chemical Corp., Electrical Division is marketing Jet-Spot, aluminum bodied flashlig which features the industry's largest transluc ring. Designed so it


NEWS, Products and People

Reynolds, Hauserman Join Forces in Partition Line

Reynolds Metals Co. and the E. F. Hauserman Co. Cleveland, Ohio base teamed up to market an entirely new line of aluminum movable partitions for office factory and help introduce the product to arc Hauserman assumes liaison butter


Looking Ahead

The steel strike could continue into August because neither side appears very anxious to go back to work. If so, some users will turn to aluminum as a substitute when supplies get lower. While minum is plenty available n

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Super Purity Costs 2c More; Consolidated is Expanding

The price of super purity aluminum ingot was increased 2 cents a pound to 47½ cents this month by Consolidated Aluminum Corp., Jackson, Tenn. Pellet was hiked 1 cent, and now costs 52½ cents. The price of super purity sheet and foil—44 cents above similar products made from standard ingot—remained the same.

Kaiser Aluminum and Chemical Corp. raised its super purity prices to coincide with those of Consolidated—a rare example of a primary aluminum producer following the lead of a smaller independent.

Consolidated is the largest producer of super purity aluminum in this country—making about 50% of all the 99.99% metal. The metal is mostly used in petroleum refining, and in the jewelry and electronics industries.

With present production capacity exceeding last year's demand for 3200 tons of super purity, this would appear to be the wrong time for price increases. But Consolidated said they were necessary because the spread between production cost and sales price was too narrow.

Consolidated recently disclosed that it has an expansion program underway to increase capacity of presently-produced grades of specification and commodity aluminum sheet by 400%. The firm says this expansion is a continuation of its program of diversification of products and integration of manufacturing facilities.

New equipment will include a cold bright finishing mill and a tension roller leveling line. Major rolling mill equipment is being supplied by the Blaw-Knox Co. and electrical equipment by General Electric.

Coiled sheet will be produced in a wide range of special and anodizing qualities. The metal will be used to manufacture building materials, quality architectural products, furniture, other consumer durables, and transportation products.

Paint Primer Reduces Fire Risk in Metal Shops

A water-base paint primer has been specifically designed for metal finishers who encounter fire hazards. The water-soluble resin, called Cargill 750, is as effective a fire extinguisher as it is a coating material claims its developer, Cargill, Inc., Minneapolis.

Cargill 750's composition has been kept confidential, but the firm says basic components are oils made from farm products. The primer is odorless and dries into an extremely hard, durable film, says Cargill.

New Lift for Titanium in Davy Crockett

Adoption of titanium as the construction material for the Davy Crockett, the Army's newest portable recoilless gun, should give a welcome boost to the metal's standing in industry. Production-wise, the Davy Crockett program is expected to call on 2,000,000 pounds of the metal, according to Titanium Metals Corp. of America. Total titanium shipments last year were about 6,500,000 pounds.

"We view the Davy Crockett as a significant development for titanium for several reasons," a Timet spokesman said. "It shows the metal to be advantageous for non-airborne applications; it highlights the reliability of heat-treated titanium forgings and extrusions; and clearly indicates the advances the industry has made in price."

Use of heat treated titanium, a metal as strong as steel but about half the weight, has produced a weight saving of 80 pounds in the gun which is capable of firing atomic shells. It is jeep-mounted in the accompanying picture.

The Army also reported that titanium's immunity to corrosion would permit indefinite storage of the weapon with a minimum need for grease and cosmolene.

While most tactical aspects of the weapon are classified, an Army fact sheet reveals that the Davy Crockett operates at temperatures from minus 65° to plus 125° F, that the weapon consists of three major thread-jointed parts, and that the titanium barrel is heat treated to provide strengths of 105 tons per square inch to withstand the firing pressures of the gun.

The gun was designed by Frankford (Pa.) Arsenal, its launching piston and ammunition by Picatinny (N.J.) Arsenal. Watervliet Arsenal will build prototype models and supervise subsequent industrial production.

Colonel Walter M. Tisdale, Watervliet Arsenal commander, speaking to a group of materials producers, stated: "I can assure you of the possibility of using titanium for critical components with a yield strength to density ratio of 1,000,000. Processing data, now presented, I believe, demonstrate that commercial processing of high strength titanium materials is virtually assured."

The yield strength to density ratio — determined by dividing the strength of a material by its weight — is probably the single most important standard for selection of any material employed in defense, with development efforts trained on attaining the "magic million" in assemblies ranging from infantry weapons to casings for missiles.

Acidic Burnishing Compound Eliminates Bright Dip Step

A burnishing compound for aluminum, zinc, steel and other metals is mildly acidic, and produces a bright blue-white color on zinc die-castings. The compound, Oakite FM #286, works well on all metals except magnesium, says its developer, Oakite Products Inc., 50A Rector St., New York 6.

The firm says the compound often eliminates the need for the bright dip operation on metals which develop oxide films. Other claims: Since it contains no soap, it will not leave a film to hinder plating; it has greater hard-water tolerance than comparable materials.

After extensive field testing, Oakite reports that one user has cut operations from nine steps to one, and estimates resulting savings of $50,000 a year.

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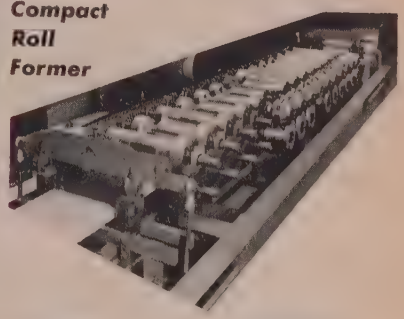

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LIGHT METALS CONSUMERS

The ten industry groups and 71 product categories listed at the right IS the Light Metals Industry. This listing, plus the number of plants shown in the right-hand column, was compiled from the circulation files of Modern Metals. All of these plants get Modern Metals regularly and top-level men in those plants read it for the type of what's-ahead light metals information you'll find in this issue.

OVER 2 MILLION TONS . . .

. . . of aluminum, magnesium and titanium will be consumed by these metal processing and product manufacturing plants in 1961. Here's where the metal will go:

INDUSTRY	TONS
Building	500,000
Transportation	420,000
Consumer Durables	300,000
Machinery & Equipment	200,000
Electrical & Communication	180,000
Packaging	100,000
Processors	100,000
Scientific & Technical	70,000
Ordnance & Military	40,000
Miscellaneous Manufacturing	90,000

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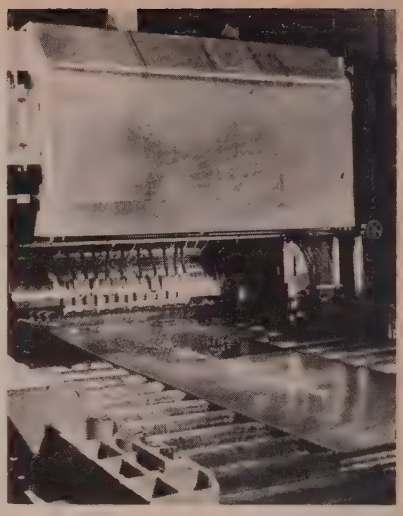
Chicago 11, Ill.

INDUSTRY AND PRODUCT	NO. OF PLANTS
BUILDING INDUSTRY	**6950**
Awnings, blinds, louvers, canopies	597
Roofing, siding, shingles, etc.	120
Air conditioning, heating, ventilating	646
Fabricators, architectural & ornamental	2058
Fabricators, sheet metal	1130
Prefabricated buildings, mobile homes	241
Windows, doors, curtain walls, storefronts	1501
Hardware, weatherstrip, insul., fittings	657
CONSUMER DURABLE GOODS	**1981**
Appliances, small: Irons, mixers, etc.	160
Furniture: Outdoor, office, household	548
Houseware, giftware, gadgets	285
Lawn mowers, tillers, rakes, fencing	209
Refrig., freezers, washers, ranges, etc.	427
Toys & sporting goods	272
Utensils, all types	80
CONTAINERS & PACKAGING	**598**
Caps, closures, collapsible tubes	77
Foil converters: Cosmetic, food, beverage	79
Containers, all types	236
Shipping & Luggage	26
Spools & reels	22
Drums, barrels, receptacles	40
Tanks, all types	83
Containers, household	35
ELECTRICAL INDUSTRY	**2019**
Communications: Radio, TV, phone	469
Electronics: Equipment & parts	570
Electrical equipment, heavy	106
Electrical equipment, light	87
Fixtures & fittings, incl. lighting	429
Motors, heavy & light	160
Wire & cable	198
MACH. & EQUIP. (NON-ELECT.)	**2634**
Industrial, general purpose	515
Engines	181
Mining & construction	80
Compressors, pumps, blowers, valves	449
Agricultural & dairy	388
Ladders & scaffolds	137
Materials handling	350
Office & store	224
Tools, portable & hand	310
SCIENTIFIC & TECHNICAL EQUIP.	**954**
Measuring & controlling	286
Aircraft, navigation, vehicle	241
Laboratory & professional	123
Safety equipment	94
Orthopedic & medical appliances	90
Photographic & optical	120
TRANSPORTATION & PARTS	**1920**
Aircraft, military & commercial	458
Hardware, aircraft & vehicle	118
Highway signs, bridge rails, light poles	44
Automobiles, buses, trucks	658
Trailers & truck trailers	294
Marine: Ships, boats, etc.	208
Railroad	71
Bicycles, scooters, carts, etc.	69
ORDNANCE & MILITARY	**132**
Weapons	34
Army	20
Air Force	10
Navy	12
Atomic energy & advanced weapons	56
LIGHT METALS PROCESSORS	**7014**
Die casting plants	1050
Foundries, sand & permanent mold	2137
Extruders & tube producers	247
Fabricators: Draw., form., stamp'g	2394
Finishers: Anodizing, plating, etc.	293
Forging, impact extruding plants	78
Fastener mfrs.: Screw machine shops	668
Reduction plants & smelters	97
Sheet, plate, foil mills	50
MISCELLANEOUS INDUSTRIES	**1137**
Chemical & metallurgical	127
Manufacturing, special & misc.	446
Signs, nameplates, displays, frames	320
Metal specialty manufacturers	244
U.S. TOTAL	**25,339**



Europe's Largest Mill Rolls 11-Foot Wide Plate

The largest aluminum rolling mill in Europe has started operation at the Rogerstone, Wales, works of Alcan Industries Ltd. — a subsidiary of Aluminium Limited.

By expansion and modernization of its continuous strip mill at a cost of nearly $20 million, Alcan Industries has increased the mill's nominal capacity from 50,000 to 70,000 tons a year, with a substantial extra capacity for hot-rolled coil and plate.

The mill is now equipped to produce aluminum plate up to 11 feet in width, and a greater diversity of sheet products. Provision is made for an eventual increase to 175,000 tons nominal annual capacity.

Alcan Industries recently adopted its name as part of a general move towards unifying the corporate identity of the many Aluminium companies. The English firm operated in Britain for 50 years as Northern Aluminium Co., Ltd., and is a fully-owned Aluminium subsidiary.

Earl Alexander, chairman of Alcan Industries, said the Rogerstone expansion was designed to meet the changing pattern of demand, in particular the growth of interest in harder aluminum-magnesium alloys. And the availability of wide plate will be of significance to the shipbuilding, railway, chemical and general engineering industries, he added.

Epoxy Adhesive Cured At Room Temperature

A two-component, contact-pressure epoxy adhesive — Maraset resin 533A — that can be cured at room temperature to provide high bond strength has been developed by Marblette Corp., Long Island City 1, N. Y.

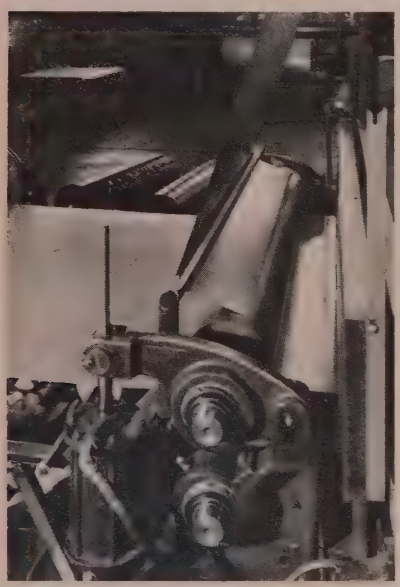
The adhesive, formulated for uses

where it is impractical to apply heavy pressure or heat for hardening, was primarily intended to join together aluminum, magnesium, steel, brass, copper, and combinations of these metals as well as other materials.

Tests of an aluminum-to-aluminum bond show tensile shear strength of 3900 psi after 10 minutes at 180°F, 3100 psi after 80 minutes at 150°F, and 2650 psi after two days at room temperature. Tensile strength is cited as 8300 psi, and hardness as 83 Shore D.

Other properties claimed: Low shrinkage, resistance to mechanical and thermal shock, high creep resistance under constant stress, low moisture absorption, and good resistance to water, chemicals, oils, solvents, and aromatic fuels.

The resin is furnished as a solvent-free, non-volatile, medium thick paste with a two-hour pot life. It meets MIL-A-8623, Type II, the federal specification for the aircraft industry.



Laminating Process Allows Deep Drawing of Material

A process which is claimed to produce a vinyl-metal laminate that can be deep drawn to a 9:1 ratio and exposed to elevated temperatures without delamination has been developed at the Chicago laboratories of Simoniz Co.

The process is called Clad-Rex 102 and is performed at a new plant in Franklin Park, Ill. The firm says the system turns out a vinyl-clad metal that is, in effect, a single element of material the forming of which requires no consideration beyond that normally given to sheet metal.

The laminate can be formed as deep as 9:1 ratios (depth of draw as opposed to corner radius), under certain conditions, without the metal fracturing or the vinyl pulling away from the metal

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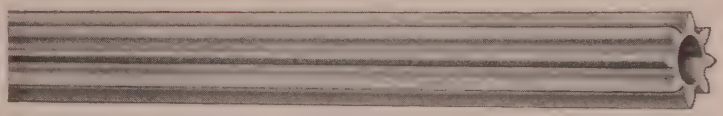

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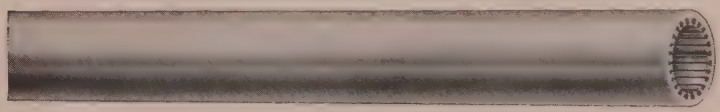

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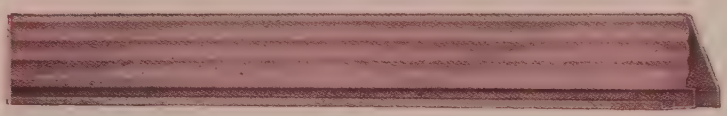

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at time of forming, says Clad-Rex. Also, after draw forming the material can be pinch or model trimmed without affecting the vinyl.

Clad-Rex also claims the material is temperature resistant without post curing or annealing between forming and trimming. A Clad-Rex laminate is supposed to withstand 200°F for four hours.

The laminating line follows standard steps of cleaning, treating and adhesive coating. Above, metal with adhesive coating is shown as it emerges from a heating oven and meets the vinyl being fed from a roll above.

Clad-Rex claims its system produces laminates with deep forming and temperature resistant properties other laminating processes do not produce. The firm, however, would not divulge how its process differs, other than to say each step in the laminating procedure has been refined.

New York Firm Wins Karl Schmidt License Job

Karl Schmidt, G.m.b.H., German developer of the low pressure aluminum casting process which is being used by Chevrolet Motor Div'n to produce the Corvair engine (MM, July '60), has named Ladd & Little, Inc., licenser of the process in the U. S. and Canada. Ladd & Little, 570 Walt Whitmam Rd., Huntington Station, N. Y., is an international engineering and licensing firm.

The new casting method has been in use in Germany since 1957 and was adopted last year by General Motors for use in its "hot metal" foundry at Massena, N. Y. The aluminum-finned head for the Corvair engine, weighing 17.7 lbs., is being cast by low-pressure molding with only 0.3 lbs. or 2% of riser to be removed instead of the normal 7 to 10 lbs. expected with permanent mold casting. General Motors Corp. has 54 of the furnace and molding units at Massena, purchased from Karl Schmidt and installed by its German engineers.

In describing the new casting process, M. V. Little said: "Special type permanent molds are used, mounted on electric induction molten metal holding furnaces. The aluminum casting metal is forced upward by air pressure of about 10 psi into the mold cavity in a relatively smooth and turbulence-free manner through a 'stalk' immersed in the molten metal and fills the mold completely.

The slow flow of metal creates a natural temperature gradient in the mold cavity and promotes directional solidification back to the source of molten metal until the casting has solidified. After the pre-set solidification interval, the pressure is released and the molten aluminum in the stalk, which has, in effect, acted as a hot riser, falls back into the melt.

Some 251,000 Corvairs were sold in the 1960 model year.

Spot Welding Tip Holders Made of Aluminum Extrusion

An aluminum extrusion has been adapted to the production of offset spot welding tip holders. Air Reduction Sales Co., New York 17, says the extrusion method of construction has kept the price of all sizes of holders to $15.20.

Each holder is a slice of an aluminum extrusion. The company reports that this permits a much faster rate of production with no sacrifice of strength or other qualities.

Holders are made with easily replaced threaded tip adapters which carry the brunt of holder wear at the tip socket. Also, when alternating between 4 RW and 5 RW taper electrodes, only the adapter and adjustable water tube need be changed, not the entire holder.

Holders come in standard 2- and 4-inch offset, and with shank diameters of ¾, ⅞, 1, 1¼, and 1½ inches.

Taping Machine Can Coat 84 by 200-Inch Sheet

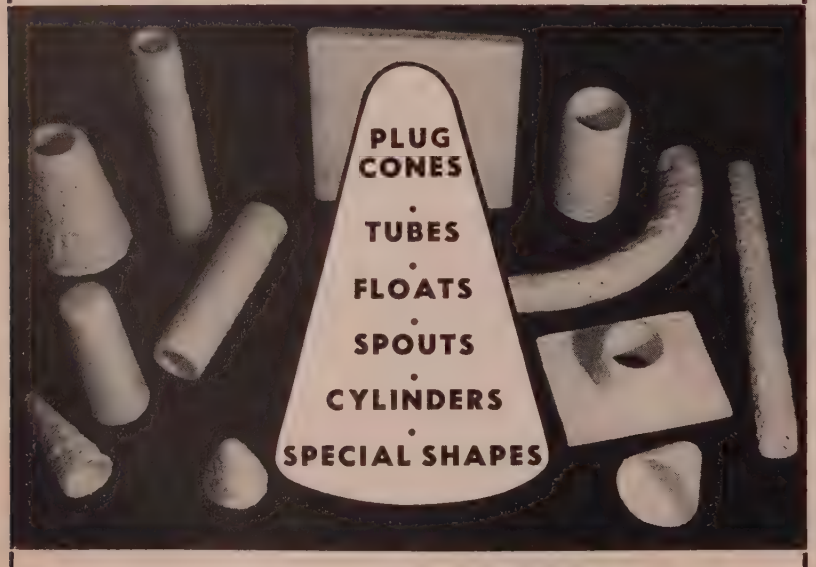
A giant automatic machine that applies protective tape to large surfaces of flat sheet and plate has been built by Westoak Machine Corp., Oakland, Calif.

The Westoak Sheet Coater was designed for Kaiser Aluminum and Chemical Corp. for coating aluminum sheet up to 84 inches wide and 200 inches long. It completely covers this size sheet in 17 seconds, claims Westoak. Two knife blades cut tape which is unreeled simultaneously from two roll shafts. Maximum taping speed is 50 fpm.

Powered by a one hp motor with reversing switch and magnetic brake, the machine can be shipped in two units if necessary, the top separate from the carriage and legs.

Tape used is Scotch No. 343 supplied by Minnesota Mining and Manufacturing Co., St. Paul, Minn.

WRP®-X INSULATING REFRACTORY . . .



Cones to fit Tap Hole Plugs in aluminum melting furnaces — resilient — labor saving — economical — give a positive seal — cleaner melting. WRP®-X products not wet by molten aluminum withstand in excess of 2000° F. *Send for new brochure.*

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Compact Unit Handles Short-Run Hard Anodizing

A desk-size electrolytic process unit for hard anodizing samples, short-run production items or for laboratory use has been developed by Allen Aircraft Products, Ravenna, Ohio.

The Model 500 Allen-Dizor was designed primarily for hard anodizing, but the unit can also be used for sulphuric and chromic acid anodizing, straight electroplating, chemical and electrochemical milling, electro-polishing, electrolytic cleaning and etching.

The unit consists of a lucite plating tank equipped with anode and cathode racks, cooling coil, and agitator; 20 amp rectifier, ¼-ton refrigeration unit and a desk-like console housing the components.

Allen also supplies anodizing solutions and test kits, and optional equipment for the unit including an immersion heater.

Operating on 120 volts a-c, the rectifier delivers 20 amperes at 100 volts d-c, sufficient for hard anodizing 60 square inches of metal. The refrigerator can maintain solution temperature from 20 to 60°F as required. Console dimensions are 45 by 22 by 40 inches high.

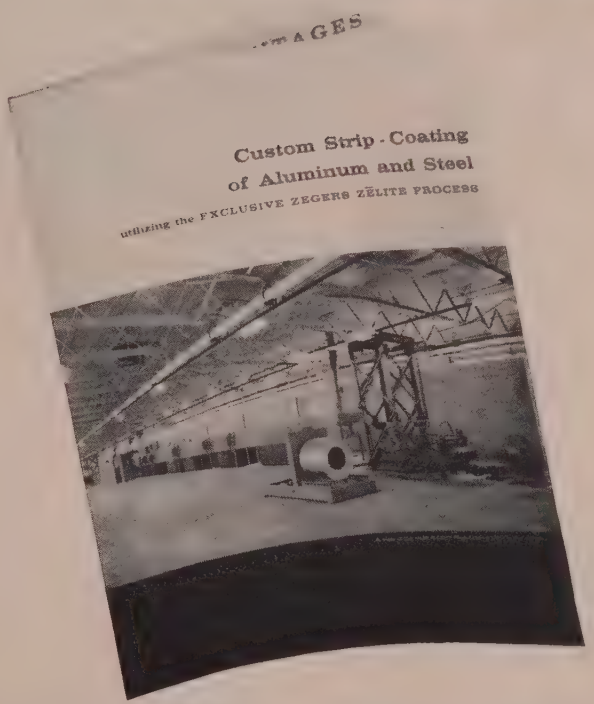
Typical uses include hard anodizing of aluminum molds, dies or wear plates, salvaging machine or production parts with hard chrome plate or hard anodizing, and restoring the lustre of old jewelry.

Dip Process Gives Aluminum Decorative Matte Finish

Wrought and extruded aluminum alloys to be used for decorative purposes can be treated to obtain a white matte finish to contrast with polished surfaces by using the Clepo-Sat-N-Mask process says Frederick Gumm Chemical Co., Inc., Kearny, N. J.

The simple dip process is said to mask surface scratches and extrusion lines, thereby eliminating costly polishing operations prior to anodizing or lacquering.

Get this important NEW STRIP-COATING FOLDER by ZEGERS



READ ABOUT THE NEW PROCESS

Zegers Zēlite gives steel and aluminum strip the finest protection and decoration—won't mar when stamped, formed, or drawn. Beautiful luster and richness—clear or colored—resists abrasion, corrosion, acid, salt . . . won't craze, crack, or discolor. Coating selections include: vinyls, alkyds, epoxies, acyrlics, plastisols, organisols.

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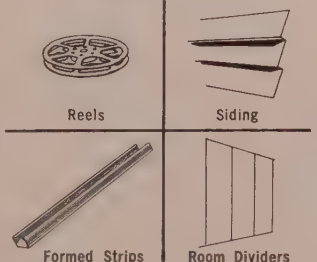

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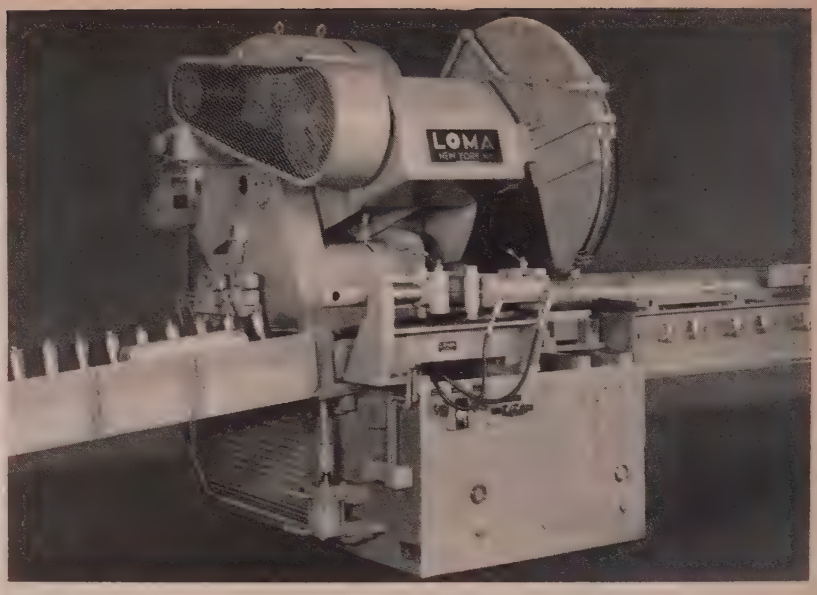

Billet Cutting Speeded by Cold Sawing Installation

A single operator can now cut large aluminum alloy billets quickly, with close length tolerances and with ultra-smooth surfaces by using an automated cold sawing installation, says Loma Machine Mfg. Co., Inc., New York.

Basis of the new equipment is 48-inch hydraulically operated circular saw driven by a 75 h.p. motor at speeds between 4000 and 8000 fpm. The saw, and integrated equipment, can handle billets 18 feet long and 16 inches in diameter.

The machine has a tilt arm, with the cut effected through a downward blade movement. This causes feed pressure to be taken by the housing, eliminating risk of chatter. The feed speed is adjustable, and the tilt arm returns automatically, minimizing idle time.

Sawblade rotation carries coolant and chips away from the operator, with chips being disposed of by conveyor.

The completely automated installation works in conjunction with a billet storage table with an escapement feed, a powered feed roller conveyor, an automatic length gauging stop and gravity discharge roller conveyor.

New, Fast-Acting Metal Treatment Developed

A new chemical surface treatment process, which for the first time color coats all types of metals in a single treatment, has been introduced by Pennsalt Chemicals Corp., Philadelphia, Pa. Called the Hinac Process, the new coating is produced in several grades, clear and colored, which are corrosion resistant, have good weathering properties and are color fast. The process combines ease of application with good corrosion resistance at economical cost, Pennsalt said.

The Hinac Process, along with seven U. S. patents, six U. S. patent applications and 31 foreign patents or patent applications, has been acquired by Pennsalt from the Heintz Division of the Kelsey-Hayes Co., with whom Pennsalt has been collaborating in the development of products and processes for metal treating for a number of years.

The Hinac Process will be marketed nationally to all types of metal processors and fabricators. Hinac coatings can be applied readily to practically any metal, producing attractive satin and color finishes. In addition to being resistant to acids, alkalis and solvents, Hinac color coatings are said to be more economical than color anodizing or painting.

Hinac coatings are applied in aqueous solution at room temperatures. A low viscosity solution which covers completely, drips free quickly with virtually no carry over, Hinac can be applied by roller coating, dip or spray following thorough cleaning and rinsing. Curing time can be as little as a few seconds, depending on the heat source.

The new Pennsalt coating process is available as Hinac-1, Hinac-2, and Color Hinac. Hinac-1 and 2 are clear coatings, producing a satin finish. Hinac-1 is equal or superior to blackplate in corrosion resistance and can be substituted for organic finishes. Carbon steel, stainless steel, aluminum and zinc plated steel coated with this grade can be welded better than untreated metal.

Hinac-2 is a heavier grade, for protecting ferrous and non-ferrous metals. Aluminum and stainless steel coated with this grade have good resistance to salt spray and have good outdoor weath-

Time for a change?

Few, if any, metalworking magazines can offer a sales case history that approaches this one

When an ad in a relatively small magazine sells 15,000 reprints to 847 top industry men, maybe it's time for you to reappraise the token response obtained from expensive space in big magazines.

☆

If the expensive catalog or coupon-type magazines aren't helping your sales department get new business, why not invest some 1961 advertising dollars in Modern Metals?

☆

Here is a magazine that can prove that it gets concentrated attention by 15,500 metalworking executives who buy over 90% of all nonferrous metals, equipment and services.

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This formula is for sale at no increase in cost in 1961— only $310.00 per page

SEND FOR A COPY OF THIS CASE HISTORY

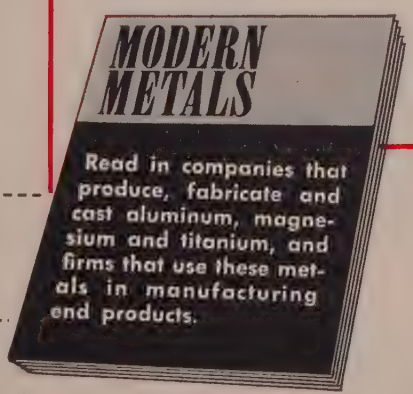
LAST year, Modern Metals devoted an entire issue to the subject of cleaning and finishing aluminum; mailed 15,300 copies of the issue to its readers.

DEMAND for additional copies quickly exhausted the extra supply. We reprinted the 36 pages of editorial content; ordered 15,000 copies, began selling them via a full page advertisement.

THE AD APPEARED in ten issues of Modern Metals. It was positioned near the front, the center and the back of the book, on both left and right hand pages.

IT GOT RESULTS. Nearly 850 top industry men bought 15,057 copies of this reprint for $4884.00. There was still a healthy volume of orders in September, so we ordered more reprints.

HERE IS PROOF of selling power. Also proof that a single ad placed in any position in Modern Metals for a year will produce top drawer sales. Industrial advertisers can get comparable results—if their ads are designed to pull orders.


MODERN METALS
Read in companies that produce, fabricate and cast aluminum, magnesium and titanium, and firms that use these metals in manufacturing end products.

MODERN METALS

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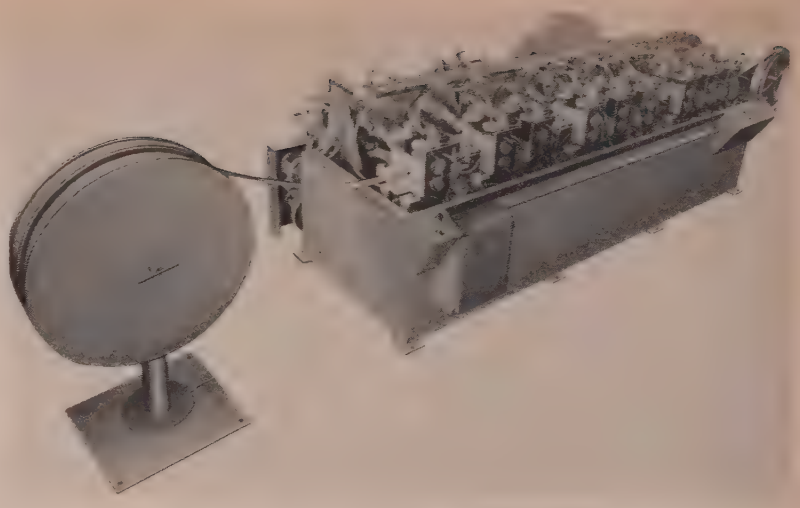
ering properties, Pennsalt reports.

Color Hinac, available in a hard, solvent-resistant grade and a ductile grade, provides both under film corrosion resistance and attractive, light-fast color. Applied to aluminum, zinc, carbon steel, stainless steel, magnesium and other metals, Color Hinac finishes are hard, durable, and resistant to salt spray. When exposed to Florida sun for a full year and 2000-hour weathermeter tests, such Hinac coated metals exhibited good weathering, fade resistance and gloss retention, according to the manufacturer. Hinac colors include red, brown, green, blue, black, gray and bronze.

Compound Cleans Magnesium for Welding

A compound which cleans dirt and oxides from the surface of magnesium in preparation for spot or other methods of welding has been developed by Bernard Chemical Products Co., Ozone Park 17, N. Y.

The cleaner, Bernite BR4, is a powder concentrate mixed with tap water for use. The firm claims there are no fuming, toxicity, heating or handling problems and that a mirror-like finish is produced on magnesium without changing the dimensions of the metal.



Frameless Mill Roll-Forms Aluminum, Steel Strip

Production Engineering Co., Riverside, Calif., has developed a compact, 9-stand, self contained rolling mill that is only 10 feet long.

This unique mill is designed to cold roll both aluminum and steel strip. All rolls are mounted in bearing blocks that are pulled together by hydraulic cylinders. Dual synchronized screws are used to push the rolls apart for regulating the gauge of material to be rolled. This eliminates the need for roll frames and makes it possible to build a tandem mill with all rolls set on very close centers. It also cuts the mill's dimensions and simplifies power transmission to the rolls.

Hydraulic loading of the rolls determines the maximum force that can be exerted against them. This serves as a safety device, preventing overloading of bearings or drive train in case of a jam up or accidental passage of a foreign object through the rolls.

Rolls may be raised hydraulically for threading or clearing, and returned hydraulically to the original gauge settings. This new mill makes it possible for many users of strip up to 12 inches wide to roll their own at a considerable savings over commercial mill prices, according to E. J. Hunter, president of Production Engineering. The mill can handle 2-inch aluminum strip from .125 down to .009 inch in one operation at speeds up to 1000 fpm.

Alcan Has Good Customer in China

Red China's aluminum consumption is growing, and Aluminum Co. of Canada, Ltd. is a major supplier.

Alcan's exports of the light metal to China in 1959 were valued at $11 million, but value of ingot sales in the first six months of this year were reckoned at $15 million. If the rate of increase remains constant throughout the year the gain will amount to 172%.

Alcan reports that its sales to China are on a spot basis, there being no long-term, binding agreement between the Canadian company and Asia's Red colossus.

China is capable of rerolling sheet for foil, utensils and other consumer items, and probably exports such products on the Chinese mainland.

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Aluminum Generator Creates Electricity For Satellites

An aluminum-sheathed generator which can convert heat from a nuclear by-product into electrical power for advanced satellites and space probes for at least a year is claimed by Martin Nuclear Div'n, Baltimore. The conversion system in the 125-watt unit uses no moving parts.

The generator is being developed by Martin under contract to the U. S. Atomic Energy Commission. It is called SNAP 1-A (System for Nuclear Auxiliary Power).

Outer skin of the 175-pound, egg-shaped device is aluminum 6061-T6 which has been chemically milled to give a dull finish and to leave slight protrusions to which thermocouples are attached. (The screw-headed caps shown in the picture mark the location of the 277 thermocouples used. Picture also shows weldor welding generator shut.)

The new system promises more power than any energy unit launched into space so far either by the U. S. or the Soviet Union. Unlike solar cells, it will not be affected by the impact of micrometeorites in space, and will be able to produce power while in the shadow of the earth. The absence of moving parts greatly reduces the chances of malfunctions.

The fuel capsule, located at the very center of the generator and supported by light metal tubing, will contain tightly sealed pellets of radioactive Cerium-144, which decays spontaneously, producing heat in the metal around it.

As the inner ends of the thermoelectric elements are heated and the outside ends remain somewhat cooler, the difference in temperature produces a small electric current in each pair.

Australian Aluminum Partners Split Up

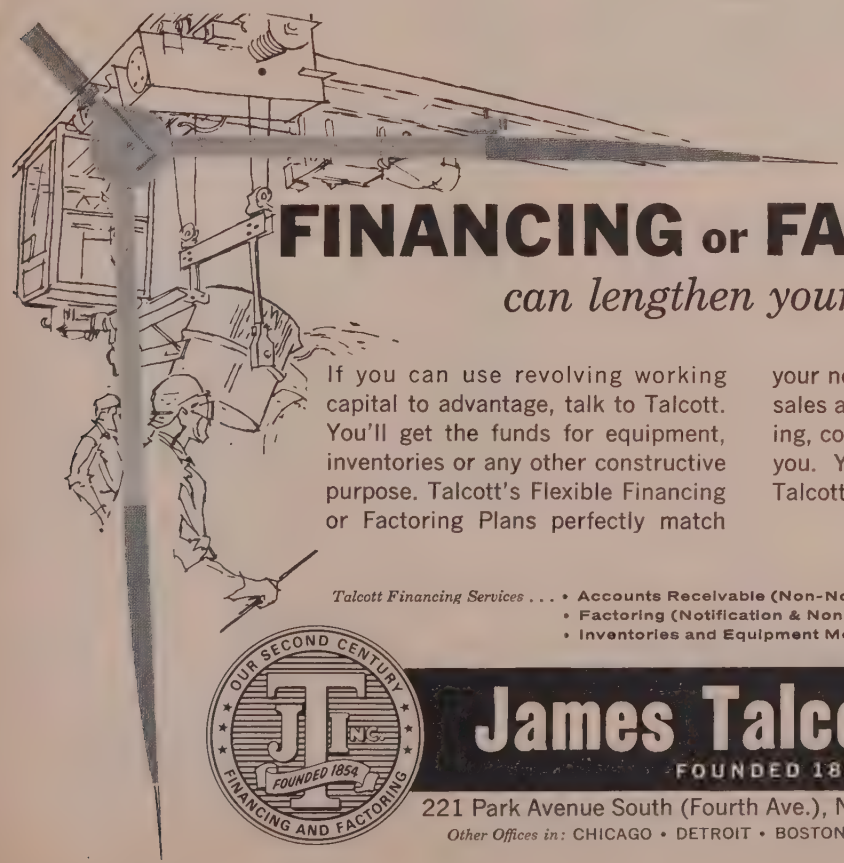
British Aluminium Co. and Consolidated Zinc Corp., Ltd., have agreed to dissolve their partnership in Commonwealth Aluminium Corp., Pty. Ltd. (Comalco) of Australia. Both parties seem to have decided that, in the light of Australia's salutary prospects in aluminum, it would be more advantageous to "go it alone."

Consolidated Zinc will continue with its own original plans for completely integrated aluminum projects in New Zealand and Australia. Plans for a large reduction plant at Weipa, in North Queensland are far along, while feasibility surveys of a Queensland aluminum smelter are continuing. Power source would be Queensland coal.

At the same time, word is that the Australian Government has given its consent for the transfer of Comalco's bauxite deposit lease to British Aluminium.

Comalco, now completely controlled by Consolidated Zinc, is expected to proceed with plans for development of Weipa bauxite. The planned alumina facility will cost at least £34 million (Australian).

Announcement had been made earlier that the Australian Government had agreed to sell its Bell Bay aluminum



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works in Tasmania to Consolidated Zinc Corp. and the Tasmanian Government. At present the plant is operated by the Australian Aluminium Production Committee. The arrangement calls for a down payment of £2.5 million (Australian), the balance of the £11 million purchase price is payable over 16 years.

The Zinc firm has asked that the industry be protected during a four year development period.

Titanium Alloy Withstands 900°F in Jet Engine Use

A new creep resistant titanium alloy extends titanium's usable strengths in jet engines to 900°F says Titanium Metals Corp. of America, New York.

The new alloy — Ti-8Al-lMo-IV — contains 8% aluminum and 1% each of molybdenum and vanadium in addition to 90% titanium.

TMCA says, that with the new metal "titanium overcomes the 650°F temperature barrier it has traditionally faced in jet engine construction." (The metal has long been used for unstressed airframe parts at temperatures nearing 1000°F.)

Development data, generated by various research programs, have prompted incorporation of the new alloy in preliminary designs of several advanced military jet engines, says the firm. Specific parts — compressor discs, spacers, blades — follow the pattern of titanium usage in engines now powering civilian and military aircraft.

TMCA claims the alloy has excellent creep resistance and rupture life; its density is .156 lb/cu inch as compared to .160 for unalloyed titanium; normal titanium dies and forging practices can be used with the new alloy; it has a high modulus/density ratio; its room temperature tensile properties are comparable to the heat-treatable titanium alloy T1-6A1-4V which has accounted for more than half of all the titanium sold to date.

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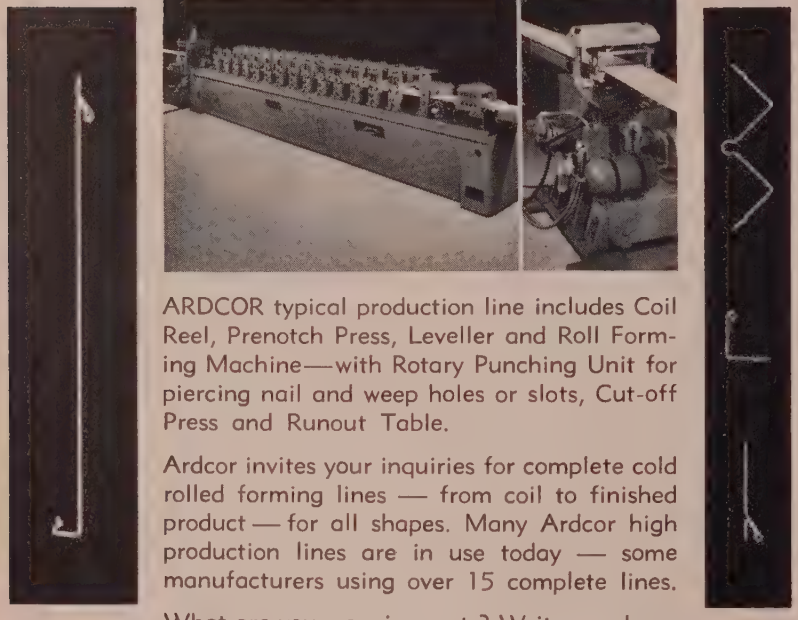

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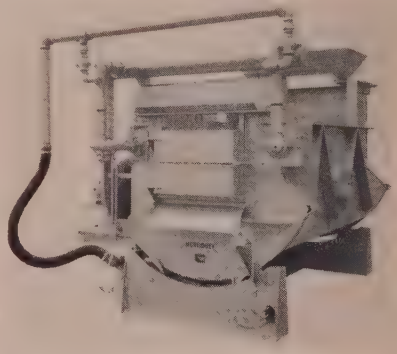

Reverberatory Furnaces Can be Direct Fired

A new line of reverberatory furnaces for aluminum sand casting, die casting and permanent mold plants has been developed by Hevi-Duty Electric Co., Milwaukee 1, Wis. The single chamber furnaces come in gas, oil or combination fuel-fired models.

The firm says the furnaces have been designed to meet industry demands for increased production. Such design includes new location of charging chutes to allow fast hopper loading; direct firing; large holding capacities.

Depending on size and type, these furnaces are capable of melting 150 to 3000 pounds of aluminum per hour with both capacities ranging from 650 to 5000 pounds. All units include burner equipment, gas pilots, firebrick or silicon carbide lining, and a centrifugal blower. Combustion safeguards and automatic metal temperature of molten aluminum controls can be provided.

Panel Has Acoustical, Insulating Qualities

A new aluminum structural panel is claimed to be stronger than any other aluminum load-bearing panel. Developed by Reynolds Metals Co., and called Reynocore, the panel is a sandwich of two flat sheets of aluminum bonded to a core of either corrugated or delta-formed sheet.

The panels, on which patents are pending, will be used in commercial and

institutional construction and farm buildings and homes. They are already specified for the roof of Coliseum 21, major theme structure of the Century 21 Exposition to be held in Seattle.

Panels come in a wide range of baked-enamel colors and embossed designs. The interior surface can be perforated for acoustical purposes. "Air pockets in the corrugated core provide adequate insulation," says Reynolds, "and once the panel is in place the job is done — there is no need for sheathing, masonry, painting or finishing."

Panels are manufactured in a variety of sizes as well as standard 4 by 8 foot sizes and in ½, 1, 2 and 3 inch thicknesses.

For the Coliseum 21 roof, 39,000 standard sized panels will fit into a grid made up of 120,000 pounds of extrusions. The roof will cover more than three acres and will be formed of four hyperbolic-paraboloids. Sections will be suspended from a net of cables fastened to concrete edge beams and steel trusses. The roof will rise to a center peak 110 feet above the floor.

Extruded Electrode Coating Gives Spatter-Free Welds

An all-position aluminum electrode with an extruded flux coating has been developed for direct-current welding of aluminum sheet, plate and castings by All-State Welding Alloys Co., Inc., 249 Ferris Ave., White Plains, N. Y.

Called Smoothcote 34, the electrode is claimed to develop tensile strengths up to 28,000 psi. Core of the electrode is aluminum alloy 4043 wire. It is coated with an extruded flux which reportedly gives quiet welding and dense, spatter-free deposits at low amperages.

The extruded flux is also said to aid flux removal and improve deposition control over that obtained with standard dip-coated electrodes.

Smoothcote 34 comes in ⅛- and 5/32-inch diameters. It is recommended for aluminum railings, tanks, pipe, truck and automobile construction and repairs, and for build-up of missing sections as well as cladding and reinforcing.

Saturn Booster Engine Sheathed in Aluminum

A super rocket engine designed to power the massive Saturn — America's first interplanetary space vehicle — has been test-fired successfully by the National Aeronautics and Space Administration.

Saturn's booster worked perfectly, generating 1.3 million pounds of thrust. The giant engine is actually a cluster of eight liquid propulsion units linked to fire simultaneously. The H-1 engines are produced by Rocketdyne division of North American Aviation, Inc.

Approximately 11 tons of Alcoa alloy 5456 sheet were used in the walls of nine fuel and liquid oxygen tanks and the booster's outer skin. Aluminum is also used in the Saturn.

It is hoped that this space vehicle will make possible manned flights to the moon, and instrumented probes of planets deep in space. First flight of the booster which is expected to be recovered, is slated for next year.

60-Inch Wide Slitter For Warehouse, Strip User

Warehouses and large-quantity strip users can reduce their slitting costs by purchasing wider mill coils and using a new 60-inch wide slitter for aluminum or steel strip claims Steel Equipment Co., Cleveland 22, Ohio.

Seco's slitter costs less to buy and to install than a mill-type model, says the firm, and it was designed for minimum maintenance and operator skill.

A welded steel base supports the main and front housing, which carries the arbors. A double main housing is provided for extra capacity.

Roller or plate type entry side-guides can be provided, and a manually operated cross-connected screwdown for the top arbor is standard.

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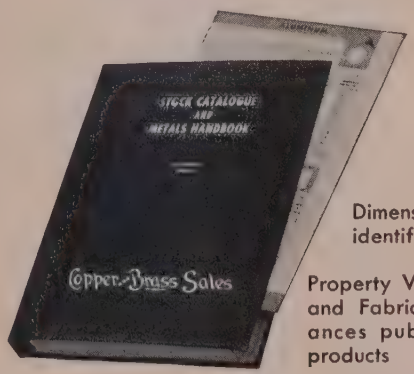

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Machine Corrugates Metal by Folding Sheet

A machine that folds metal in corrugated shapes has been developed by the Twin Coach Co., Buffalo, N. Y.

Corrugated metal produced by the machine can be used in air conditioners, space heaters, heat evacuators, wave guides, curtain walls, vehicle bodies and shipping containers.

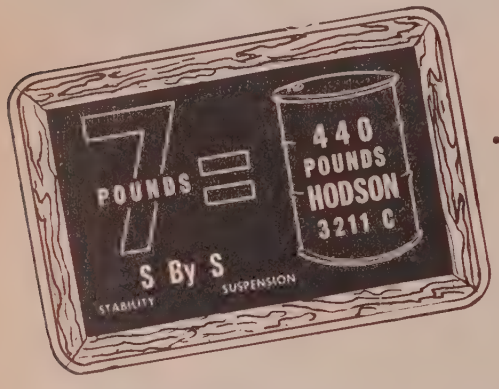
The unit employs a new concept in metal forming by folding metal. This contrasts to the traditional method of forming corrugations by drawing, says a company spokesman.

The key element in the process is a cam-controlled action, which moves the forming dies in both horizontal and vertical planes. Simultaneous perforating, off-setting, slotting or lancing is possible.

The new machine can form aluminum, brass, stainless and regular steel, as well as plastic and cardboard. Corrugated patterns can be embossed, sheared, bent or stretched.

Die costs range from $800 for a simple design to $3500 for a complex design. Dies rarely have to be replaced below 1000 hours of use, says the firm.

At present, folded metal comes in gauges ranging from 0.002 to 0.030 inch, at a tolerance of ± 0.001 inch. Metal up to 36 inches wide is being processed.



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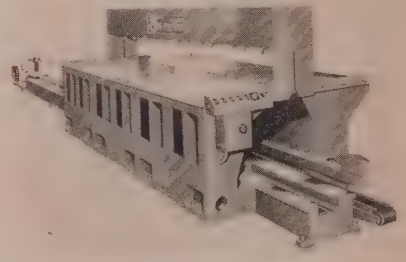
Die Cast FS Boxes Have Greater Strength

Three new series of completely interchangeable FS boxes made by Stonco Electric Products Co., Kenilworth, N. J. accommodate virtually every cover, plate and wiring device on the market, the manufacturer reports. Included are weatherproof boxes taper-threaded for rigid conduit, boxes with special "rivet-point" locking set-screws for thin-wall E.M.T., and a complete specification-grade line with deluxe compression-fittings to cut installation time in half in severe-service locations.

Boxes are die-cast aluminum in a new design for greater structural strength with less weight. Built-in extras include grounding screws, inside mounting knockouts, back drainage "feet" to prevent wall streaking, and hub constructed for maximum wiring space.



Automated Saw Speeds Production Cutting of Metal

Production cutting of ferrous and nonferrous metals can now be done with a heavy duty unit designed along machine tool lines by Oliver Machinery Co., Grand Rapids, Mich.

The unit, No. 849 heavy duty plate saw, has a carriage approximately 6½-feet long. It rides on nonmetallic ways 5 inches wide on one side and 6 inches wide on the other, with a total bearing surface of over 600 square inches. Saw carriage feed is through a Reliance V-S drive to a reduction unit with a helical gear on the output shaft fitted to a helical rack located in the center of the bed. Feed settings are on a rheostat control near the operator.

Financial Briefs

Alcoa's Third Quarter Net Down from '59

Sales of Aluminum Co. of America in the first three quarters of 1960 totaled $657,576,707, as compared with $643,070,081 for the same period last year. Net income totaled $30,279,511, or $1.33 per common share, as compared with $41,497,805, or $1.88 for the same period in 1959. Sales in the third quarter of $214,547,756 netted $8,553,203 (37 cents a share). Last year third quarter sales were $218,159,275, producing a net of $12,561,472, or 56 cents a share.

Aluminium 3rd Quarter Net Topped Like Period in '59

Aluminium Limited sales and profits in the first nine months of the year were $336,881,000 and $31,955,000, equal to $1.05 a share. This compares with sales of $275,342,000 in the same period in 1959 which netted $15,236,000, or 50 cents a share. Sales in this year's third quarter were $110,025,000 for a net of $10,136,000, or 33 cents a share, compared with $91,377,000 and net of $4,666,000, or 15 cents a share, in the same period last year.

Kaiser Sales, Profits Up

Third quarter net of Kaiser Aluminum & Chemical Corp. amounted to $5,802,000 from sales of $99,324,000. These earnings were favorably affected by a Federal income tax adjustment for the period January 1, 1959, to June 30, 1960, amounting to approximately $1,800,000, Kaiser reported. Earnings in the same period last year were $2,014,000 on sales of $101,806,000. Sales and earnings for the nine months to date were $313,584,000 and $17,539,000 respectively, compared with $323,113,000 and $15,236,000 for '59.

Olin Reports Progress

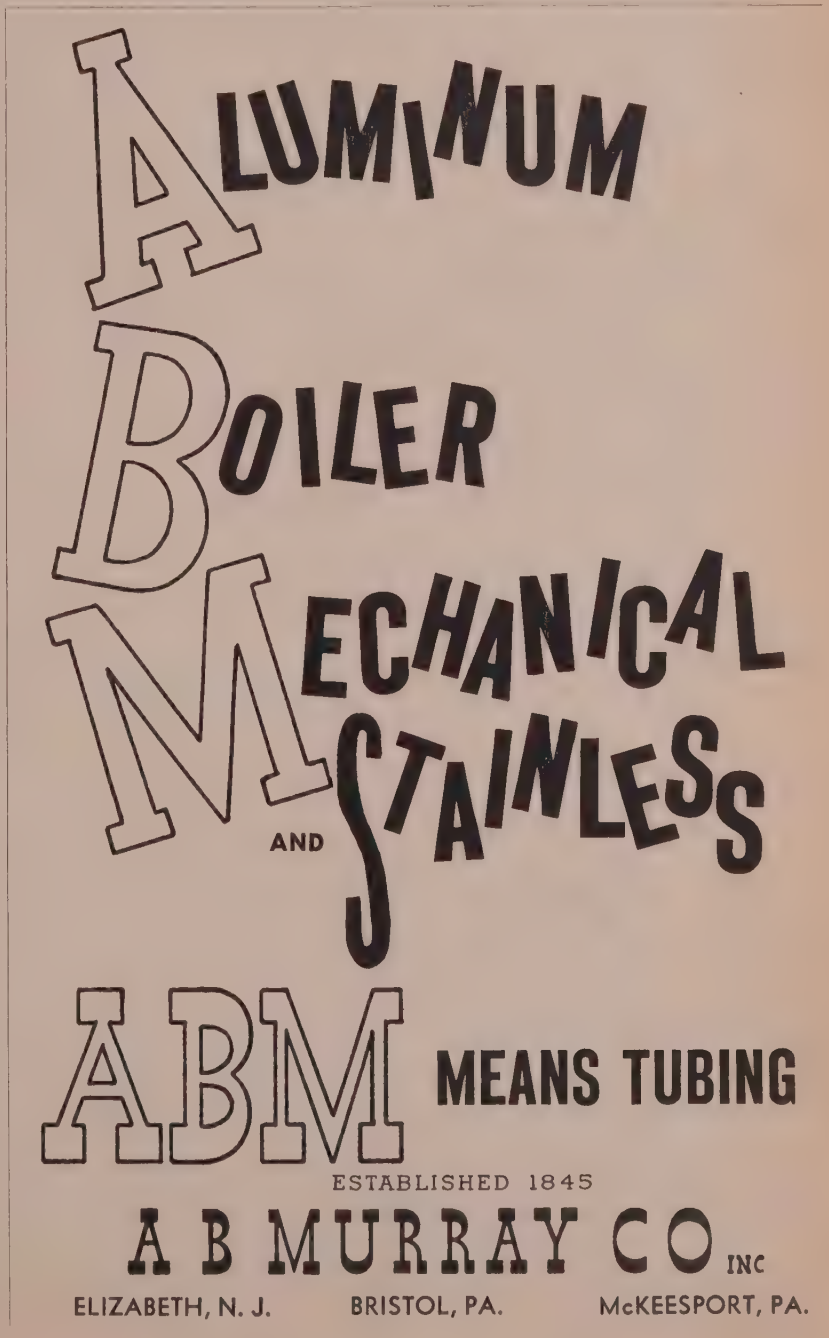
Aluminum operations of Olin Mathieson Chemical Corp. are making "substantial progress" despite "weak market conditions and soft prices," the company reported. Losses from aluminum operations in the first nine months of 1960 were about 9 cents a share, compared with 32 cents a share in 1959. During the third quarter Ormet, Olin's aluminum producing affiliate, paid $10 million on its outstanding bank loans, for a total reduction of $40 million during the past two years. These repayments are a charge on the cost of aluminum, Olin points out.

Revere Copper & Brass Sales, Profits Down

Net income of Revere Copper & Brass Inc. for the first nine months of 1960 was $5,246,514, equal to $1.95 a share on 2,680,505 common shares then outstanding. This compares with a net income of $7,658,037, or $2.87 a share, for the same period of '59 when there were 2,659,406 shares outstanding. The company's fourth quarter earnings are expected to better the 52 cents per share earned in the third quarter which was affected by the annual two-week vacation shut-down.

Reynolds Metals Co. Reports Reduced Earnings

Sales by Reynolds Metals Co. for the first nine months of 1960 amounted to $330,056,000, netting the company $19,072,000 after provision for income taxes of $10,772,000. This was equivalent to 94 cents per common share. In the first nine months of '59 sales were $366,282,000, with net income of $31,406,000, equivalent to $1.68 per common share. Third quarter sales were $113,942,000 compared with $109,499,000 in the second quarter. Third quarter net was $5,854,000 compared with $7,168,000 for the second quarter, including equity in net income of unconsolidated subsidiaries and associated companies of $1,531,000 for the third quarter and $1,180,000 for the second quarter.



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Looking Ahead

There's over a half million tons of primary aluminum in inventory—or about three months' supply, the highest ever. And it's available at the market price, at other prices, and still other prices. Until the election went for Kennedy, we thought the price of primary would drop to 23 or 24¢ a pound by February. Not so sure now, because there's bound to be more inflation. Aluminum ingot is steadily going to a global price; a sort of a high-class commodity item. It's now being sold abroad to meet the market price over there. This month, French producers raised their primary to 22.4¢ to get closer to the British price of 23.5¢. Barring runaway inflation, look for the ingot price to settle at about 23 to 24¢ next year.

Potlines are being quietly shut down this month, and at least another 100,000 to 150,000 tons of capacity will have to be idled to balance the supply-demand picture. Over two million tons will be produced in the U. S. this year — an all-time high. So cutbacks, which will probably drop the operating rate to 75% of capacity, aren't nearly as severe as steel's downturn. (Steel is being hurt more by the compact auto fad than anything else; aluminum is almost being held up by it.) Aluminum producers hate to shut off potlines — particularly since most of their current (and inadequate) profit is coming from ingot sales.

One big user, after analyzing his first nine month sales, suggests that all aluminum products be priced at 26¢ a pound. This would rub out enough paper work and politicking to more than offset the losses. This comic may not be far off base. If producers' fourth quarter earnings continue at the January-September rate, they'll wind up making a total of about $90 million, or slightly less than 3¢ a pound after taxes on all the raw metal they produce. Since this doesn't equal what they should make on ingot, it must mean that they're losing heavily on mill products—whether sheet, foil, extrusions, or you name it.

Biggest aluminum money-maker so far this year is Aluminium Limited, which made $32 million on sales of $380 million — for the best three quarters of any year in its history; even declared a 10¢ extra dividend this month. However, the company has been getting substantial payments for cancellation of Alcoa's ingot contract which may have increased earnings by 15 to 20%. Aluminium Limited has been operating at a rate of 700,000 tons a year; is cutting back to a 600,000-ton rate to level out production with anticipated future sales.

The big Canadian producer will almost automatically add about 100,000 tons in a new market early in 1963, as a result of forming a co-op with Bridgeport Brass, Scovill Mfg., and Fairmont Aluminum last month. As detailed in the article on page 30, the new company will build a $30 million reroll mill here which presumably will give all four a major price advantage. When completed, this could add some $50 million per year in sales for Limited; would result in lost sales for U. S. producers who have vast reroll capacity in their plants. Observers are wondering whether reroll stock will be added to the list of commodity prices next year.

Signs of order pickup for aluminum in building are developing in Wisconsin and Illinois; could help aluminum sales pick up fast in first quarter. Kennedy's aim will be to pump money into building — housing, schools and highways — if he's to fulfill his new prosperity claims. Building materials firms anticipate a better 1961; see a shot in the arm from home remodeling and repairs. Meanwhile, big lumber firms are cutting production in an effort to stabilize prices. Building products are using 23.8% of all semi-fabricated aluminum; are widening the gap over all other user industries.

Biggest commodity product is can stock which was cut again this month. As Bill Stolk of American Can cited last July, competition for container stock will get rougher. He was skeptical about aluminum because "current prices are unsound . . . due to an over-supply of the metal." Since then, the steel people have come up with a new, lighter gauge and cheaper stock — which container firms have happily accepted. Last August, Kaiser Aluminum cut its can stock price by 1% to 32.2¢; other producers followed suit this month. Most of this sheet goes into citrus fruit cans; in coil form it now sells at 30.7¢ a pound. Based on current volume, this product is a sick pigeon; cannot be profitable except at the ingot level.

Die castings will surpass gray iron castings within five years, claims Doehler-Jarvis' Bauer. Big reason is that every car engine builder is watching the die cast American Motors job featured on this month's cover. Biggest arguments: Faster production; no sand cores; little machining; much lighter. Before this revolution gets rolling, auto men must give die casters more liberty to redesign and change the engine's shape, and redesign the head. Die casters may have to come up with alloys having better elasticity — especially for cooling fins. But the breakthrough has arrived. Next big surge will be when color anodized alloys become available. Then a big upsurge for toys, all appliances, office machines and hardware. Output is currently at rate of 200,000 tons a year; more than sand and permanent mold castings combined. A doubling in usage will develop fast.

— The Editors

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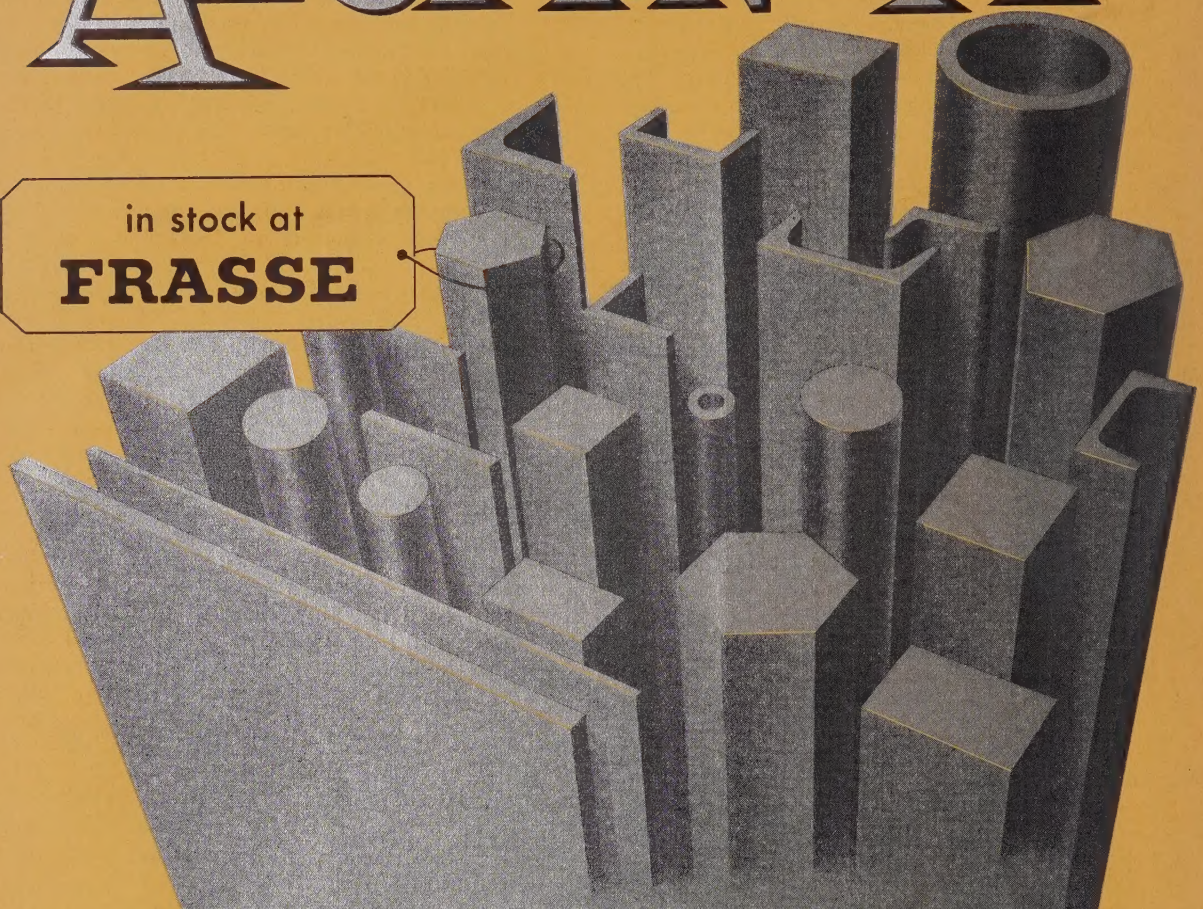

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